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## MICRO JOURNAL

VOLUME VI ISSUE IV • Devoted to the 68XX User • April 1984  
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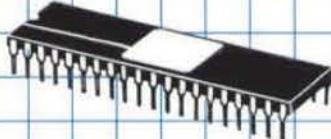
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# MICROWARE'S OS-9 IS NUMBER ONE.

## OS-9 NOW HAS THE LARGEST USER COMMUNITY

More users now run OS-9 on their 6809 computers than all other operating systems combined. This outstanding success story was no accident — it's due to OS-9's technical excellence backed up by outstanding Microware support. OS-9's Unix-type architecture and totally modular design gives your computer more power and versatility. OS-9 also gives you more possibilities for customization so you can tailor your system exactly to your needs. And aren't flexibility and performance the reasons you chose a 6809 computer to begin with?



## OS-9 HAS BEEN CHOSEN BY OVER 50 6809 SYSTEM MANUFACTURERS

OS-9 is now offered as a standard operating system by almost every 6809 system manufacturer and has been designed into an amazing variety of dedicated systems and products including personal and business computers, process control systems, data and telecommunications systems, and more. In all, over 50 companies and organizations have

obtained OS-9 distribution licenses including such well-known names such as General Motors, NASA, Fujitsu, Western Electric, Motorola, Sykes Datronics, Eastman Kodak, Thomson-CSF, and Tandy Corp.

## OS-9 GIVES YOU A SOFTWARE BASE TO BUILD ON

Whatever your application, OS-9 speaks your language! Microware offers BASIC09, an Extended/Structured Basic, a complete C Compiler, a full ISO Pascal Compiler, the ANSI Standard CIS Cobol Compiler, plus Relocatable Macro Assembler. These high performance programming languages are all fully implemented and deliver unmatched performance and outstanding features. Additionally, OS-9 compatible applications packages such as word processors, screen editors, spreadsheets, business software, and utilities are offered by a rapidly growing number of third-party software houses.

## PLUS OUTSTANDING MICROWARE SUPPORT: WE KEEP IN TOUCH WITH YOU

Even when you have the best software and documentation, there can be times when you need questions answered. That's why Microware is committed to giving OS-9 users the best possible personalized service. Here are some

of the ways we deliver solid support:

- A Software Support Hotline for direct access to our technical staff
- "Pipelines", our free quarterly newsletter
- OS-9 User Seminars, the annual OS-9 community gathering
- a liberal update policy for new releases

Microware does business on a person-to-person basis. When you call you'll find yourself speaking with someone who's both knowledgeable and genuinely interested in helping.

## YOU CAN COUNT ON OS-9 NOW AND IN THE FUTURE

Microware is not standing still — we're firmly committed to continuing support for the 6809 and we will continue to introduce exciting new software products for the 6809. We will soon announce OS-9/68000 and programming languages for the 68000 which will be upward compatible with 6809 versions, so if and when you are ready for the 68000 your OS-9 software can go with you.



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# '68'

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Portions of the text for '68 MICRO JOURNAL was prepared using the following furnished hard/software.

#### COMPUTERS-HARDWARE

Southwest Technical Products  
219 W. Rhapsody  
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S09-5/8 DMF disk-CDS1-8212W-Sprint 3 Printer

GIMIX Inc.  
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Technical Systems Consultants, Inc.  
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Chapel Hill, NC 27514  
FLEX-Editor-Processor

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Idaho Falls, ID 83401  
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#### Send All Correspondence To:

Computer Publishing Center  
68 MICRO JOURNAL  
5900 Cassandra Smith  
PO Box 849  
Hixson, TN 37343  
615 842-4600

Copyrighted 1984 by  
Computer Publishing Inc. (CPI)

'68' Micro Journal is published 12 times a year by Computer Publishing Inc. Second Class Postage Paid ISSN 0194-5025 at Hixson, Tenn. and additional entries. Postmaster: send Form 3579 to '68' Micro Journal, PO Box 849, Hixson, Tennessee.

#### SUBSCRIPTION RATES USA

1-Year \$24.50 2-Years \$42.50 3-Years \$64.50

#### FOREIGN

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#### Items Submitted for Publication

Articles submitted for publication should be accompanied by the authors full name, address, date and telephone number. It is preferred that articles be submitted on either 5 or 8 inch diskette in TSC Editor format or STYLO format. All diskettes will be returned.

The following TSC Text Processor commands ONLY should be used (due to our proportional processor): .sp space, -pp paragraph, .fi fill and .nf no fill. Also please do not format within the text with multiple spaces. The rest we will enter at time of editing.

STYLO commands are all acceptable except the ,pg page command, we print edited text files in continuous text.

All articles submitted on diskettes should be in TSC FLEX" format, either FLEX2 6800, or FLEX9 6809 any version.

If articles are submitted on paper they should be on white 8X11 bond or better grade paper. No hand written articles (hand written or drawn art accepted). All paper submitted articles will be photo reproduced. This requires that they be typed or produced with a dark ribbon (no blue), single spaced and type font no smaller than 'elite' or 12 pitch. Typed text should be approximately 7 inches wide (will be reduced to column width of 3 1/2 inches). Please use a dark ribbon!

All letters to the editor should also comply with the above and bear a signature. Letters of 'gripes' as well as 'praise' are solicited. We attempt to publish all letters to the editor verbatim, however, we reserve the right to reject any submission for lack of 'good taste'. We reserve the right to define what constitutes 'good taste'.

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3

## HARDWARE

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## OS-9 GMX III/FLEX SYSTEMS (#79)

The #79 super system now includes (in addition to the above): the GMX 6809 CPU III, a 256K CMOS Static RAM Board (#72), and a 3-port Intelligent Serial I/O Processor (#11).

The GMX 6809 CPU III can perform high-speed DMA transfers from memory to memory and uses memory attributes and illegal instruction trapping to protect the system and users from program crashes. If a user program crashes, only that user is affected; other users are unaware of the problem.

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## SOFTWARE

All OS-9/FLEX systems allow you to software select either operating system.

Also included is the **GMXBUG** monitor and, in systems with 128K or more of RAM, **GMX-VDISK** for FLEX.

All **GIMIX** OS-9 systems include **Microware's** Editor, Assembler, Debugger, **Basic09**, and **Rumb**; and the GMX versions of **RMS** and **DO** for **OS-9**.

All **GIMIX** versions of **OS-9** can read and write RS color computer format **OS-9** disks, as well as the **Microware/GIMIX** standard format.

New and exclusive with **OS-9 GMX III** systems is the **GMX OS-9 Support ROM**, a monitor for **OS-9** that includes memory diagnostics and allows the system to boot directly from either hard disk or floppy.

A wide variety of languages and other software is available for use with either **OS-9** or **FLEX**.

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## OS-9 GMX II / FLEX SYSTEMS #39

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with #88 dual 8" DSDD drive system	\$6198.39
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Contact GIMIX for price and availability of UniFLEX and UniFLEX GMXIII Systems.

NOTE on all drive systems: Dual 40 track drives have about 700KB of formatted capacity; dual 80's about 1,400KB; dual 8" about 2,000KB. The formatted capacity of hard disks is about 80% of the total capacity.

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Simply add additional memory and I/O boards. Your **GIMIX** system can grow with your needs. Contact us for a complete list of available boards and options.

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with battery back up	
#57 64KB STATIC RAM board	\$478.67
#11 3 port Intelligent serial I/O board	\$498.11
#43 2 port serial I/O board	\$128.43
#42 2 port parallel I/O board	\$88.42
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## TRADE UP YOUR CoCo!

GIMIX will allow you up to \$1100.00 credit toward the purchase of any **GIMIX** system when you trade-in your working Color Computer, peripherals, and original software. The trade-in value is limited to 110% of the **RADIO SHACK** list price at the time your order is placed. You pay the freight. This offer is good only in the Continental U.S.; is limited to the first 100 orders; and expires on 9/30/84. Only one trade-in per customer.

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# Microware presents 4 new OS-9 software packages.

## 1

### LEVEL II PRINT SPOOLING SYSTEM

This versatile package gives your OS-9 Level Two System a complete print spooling management capability for time-sharing applications. Features of the spooling system are:

- Handles up to seven independent spooling devices and queues with "print on first available device" feature.
- Prints large block header pages between listings with date, time, user name and job name.
- Multiple listing copy option.
- Complete forms change capability for each job and device.
- Prints formatted or unformatted listings.
- Status command displays print queues and status.
- User can kill or change priority of queued jobs.

Available only for OS-9 Level Two Systems.

Suggested List Price: \$150.00 Manual Only: \$15.00

## 2

### RMA RELOCATABLE MACRO ASSEMBLER

At last — a full feature relocatable macro assembler and linkage editor for OS-9. RMA permits sections of assembly language programs to be independently assembled to "relocatable object files". The linkage editor takes any number of program sections and/or library sections and combines them into a single executable OS-9 memory module. Global data (including indexed and direct addressing modes) and program references are automatically resolved in the process. The macro facility permits commonly used statement sequences to be defined, then used within the program with appropriate parameter substitution. RMA also supports conditional assembly and library source files.

Suggested List Price: \$200.00 Manual Only: \$20.00

## 3

### OS-9 FILE HANDLER TOOLBOX

Introducing a special toolbox for OS-9 users who do a lot of file manipulation! A collection of 12 useful OS-9 command

programs; Most can be used as "filters" using OS-9 pipeline facilities. Included are:

**D** — unformatted directory listing with "wild card" matching  
**Compress** — does character compression on text files.  
**Expand** — restores a "compressed" file to the original state.  
**Split** — breaks a file into smaller files.  
**Space** — indents lines with optional spacing between lines.  
**Code** — decodes any key on a keyboard to hex.  
**Qsort** — quick sort for small files, directories, etc.  
**Pr** — versatile formatted file printing utility.  
**Tr** — transliterates text pattern to substitution pattern.  
**Grep** — searches file for a pattern and prints matching lines.  
**Xmode** — same "tmode" except changes are made to the device descriptor.  
**Count** — counts words, lines, or characters within a text file.  
**Suggested List Price \$85.00**

## 4

### ENTERTAINMENT PACK I

A collection of games and other interesting programs that are not only entertaining but serve as good instructional examples of Basic09 programming techniques. All programs include complete Basic09 source files and can be easily edited to run on standard alphanumeric or graphics terminals.

**Blikjak** — A Vegas-rules blackjack game.  
**Clk** — graphical display of a wall clock on your terminal.  
**Dogs** — Greyhound racing with simulated graphics.  
**Eliza** — Basic09 version of the famous artificial intelligence simulation of natural language dialogue with a psychiatrist.  
**Haiku** — Program that creates original "haiku" prose.  
**Quest** — a mini-Adventure game.  
**Rats** — find your way out of a computer-generated maze — from a rat's point of view.  
**Towers** — a graphical display of the solution to the "Tower of Hanoi" puzzle.  
**Suggested List Price: \$85.00**



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# FLEX™ USER NOTES

## THE 6800-6809 BOOK

By: Ronald W. Anderson

As published in 68 MICRO JOURNAL™

More help than any other thing I have ever read, except 68 Micro Journal, of course. Come on with the C book on Norm Commo's column. D

SWELL! - Best buy EVER in a 6800/6809 book.  
JTW

The publishers of 68 MICRO JOURNAL are proud to announce the publication of Ron Anderson's **FLEX USER NOTES**, in book form. This popular monthly column has been a regular feature in 68 MICRO JOURNAL SINCE 1979. It has earned the respect of thousands of 68 MICRO JOURNAL readers over the years. In fact, Ron's column has been described as the 'Bible' for 68XX users, by some of the world's leading microprocessor professionals. Now all his columns are being published, in whole, as the most needed and popular 68XX book available. Over the years Ron's column has been one of the most popular in 68 MICRO JOURNAL. And of course 68 MICRO JOURNAL is the most popular 68XX magazine published.

As a SPECIAL BONUS all the source listing in the book will be available on disk for the low price of: FLEX™ format only — 5" \$12.95 — 8" \$16.95 plus \$2.50 shipping and handling, if ordered with the book. If ordered separately the price of the disks will be: 5" \$17.95 — 8" \$19.95 plus \$2.50 shipping and handling.

Listed below are a few of the **TEXT** files included in the book and on diskette.

All **TEXT** files in the book are on the disks.

LOGO.C1  
MEMOVE.C1  
DUMP.C1  
SUBTEST.C1  
TERMEM.C2  
M.C2  
PRINT.C3  
MODEM.C2  
SCIPKG.C1  
U.C4  
PRINT.C4  
SET.C5  
SETBAS1.C5

File load program to offset memory — ASM PIC  
Memory move program — ASM PIC  
Printer dump program — uses LOGO — ASM PIC  
Simulation of 6800 code to 6809, show differences — ASM  
Modem input to disk (or other port input to disk) — ASM  
Output a file to modem (or another port) — ASM  
Parallel (enhanced) printer driver — ASM  
TTL output to CRT and modem (or other port) — ASM  
Scientific math routines — PASCAL  
Mini-monitor, disk resident, many useful functions — ASM  
Parallel printer driver, without PFLAG — ASM  
Set printer modes — ASM  
Set printer modes — A-BASIC  
(And many more)

\*\*Over 30 **TEXT** files included in ASM (assembler) — PASCAL — PIC (position independent code) TSC BASIC-C, etc.

NOTE: .C1, .C2, etc. = Chapter 1, Chapter 2, etc.

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Published Monthly by Computer Publishing Inc., Hixson, TN.

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## Color Micro Journal

The Color Computer Monthly Magazine

\$1.95 per issue Vol. 1, Issue 2 October, 1983

### THIS 'N THAT

The BIG NEWS this month is that OS-9 has finally arrived for the Color Computer. The ASTOUNDING part of the Radio Shack OS-9 Package, besides the price, is the DOCUMENTATION. You 'Old Time Radio Shack Followers' will not believe what you see. Jon Shirley has been telling us that the main reason for the "lack" of documentation with a lot of their products was the restrictions placed on releasing that information by Microsoft. I

One of the "Operating Systems of the Future" is now available for the "little old Color Computer"; OS-9. Freely translated, OS-9 means "Operating System for the 6809" (OS-9 is now being written for the 68000, also). Since it is fairly obvious that UNIX and "UNIX-Type" Operating Systems will be running on just about every computer to come out in the next few years, a whole new language is beginning to appear on the horizon.

Color Computer OS-9, the Package

We had been running a preliminary release of OS-9 on the Color Computer for a few weeks, and received the "Official Radio Shack" version for Review a couple of days ago. To put it mildly, this package is IMPRESSIVE! For \$69.95 (Radio Shack Catalog Number 26-3838), you receive a 9 1/2" x 7 5/8" x 2" package containing 4

### OS-9 on the COLOR COMPUTER

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**TMP/Manager** is a structured database manager, and is the ultimate driving force behind any total Management/Marketing Planning system. Its built-in select/sort/merge module — and optimized machine code — makes it super-fast, and provides unusually nimble data manipulation characteristics. Other outstanding features are detailed prompting, easy identification of data fields, and an excellent security system.

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**TMP FreeForm** fills the void between a structured DBMS and word-processing. It's an "electronic index card" package with an endless list of valuable applications such as parts cataloging, look-up inventories and listings of any kind. Type anything on up to 32,000 electronic "cards" of up to 9 pages each that reside in "file drawers" (databases). Up to 13 key-words can call each page.

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through "hands on" exercises that instantly build confidence, and minimize reference to manuals.

**CLEAR DOCUMENTATION** is specially prepared for each TMP package. Remarkably readable because they are conversational in style and logically organized, this series of manuals further assures quick user comfort and productivity with TMP software. Includes sections on how to best utilize the system: Integrating user-written software with TMP packages, and other bonus topics.

**VIDEOTAPE PROGRAMS** are available to TMP Dealers. They dramatically take the viewer into real business environments for a close look at how a TMP software package is utilized. Video programs can be personalized for specific organizations. Programs may be specified for most popular tape formats.

**THE BOTTOM-LINE IS THIS:** Software is only as effective as its training and documentation. TMP packages are incomparable in both areas.

Endurance-Certified Chieftains are consistently among the fastest computers in CPU and I/O speeds according to the widely respected BENCHMARK REPORTS. That, combined with almost legendary reliability, makes Chieftains the logical choice in computers using OS-9 operating systems.

Configurations range from floppy-disk systems to multi-user, multi-tasking Winchester hard disk systems with tape back-up; performance approaching mainframes at prices you can live with.

TMP software packages for most OS-9 systems and Chieftain computers are offered exclusively from Smoke Signal. Inquiries from non-Smoke Signal dealers are invited. Call (213) 889-9340.

**TMP** T.M.



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# Flex User Notes

Ronald W. Anderson  
3540 Sturbridge Court  
Ann Arbor, MI 48105

## Human Nature

This is not being written to make anyone look foolish. If it were, I would be a prime candidate for being the foolish one. I'd like to go into a little story here that I think reveals something about how we tend to stick with something with which we are comfortable, rather than risk trying "the easy way" that we don't know as much about.

You all have heard my tale of how I got started in computing with a KIM-1 single board computer back in 1977, so I won't go into the whole story. That system had a Hexadecimal keypad and six seven segment displays. To write a program for it, it was necessary to use the program card to translate the instructions into the proper Hex machine codes, calculate branch and offset values in Hex, and then enter the program via the keypad. I became fairly proficient at doing it that way. About a month after starting with the KIM-1, I ordered a SWTPc system. It arrived a few months later, and I learned the 6800 instruction set and started coding in machine code again, with good success.

Along with the system came Motorola's Co-Res assembler, a combination editor and assembler package. I was hesitant to use it because of all the assembler directives and pseudo operation codes I would have to learn. When I expressed my fears to the local computer store owner, he laughed and told me that I had been doing it the hard way for several months, and that a few hours with the assembler would convince me that my fears were unfounded. Of course he was correct. Using the assembler turned out to be so much easier than hand coding, that I was able to go on to bigger and better programs with much less overall effort.

Recently, I have found myself consulting for a small company in the area of software. I'm pushing that company to start using a compiler. The reasons I get back for not switching, sound just like my objections to starting to use the assembler so long ago. The customer feels comfortable with assembler. It is easy to make changes, using assembler. "Besides, the little box we are programming has to communicate with another computer via a couple of parallel interfaces which will require drivers in assembler anyway" (customer's words, and not true as you will see below).

I still find myself guilty of resisting change for reason of familiarity. I have some hardware sitting here (have had it for two or three months) with which I could be up and running OS-9 with a little work on my hardware. I don't get around to it because I am so familiar with FLEX that I am comfortable, and don't want to expend the effort to learn a "new operating system". I look at the 68000 and make excuses to resist starting to get a system together to use it. I probably will get around to that when I find an application in which the 6809 simply can't do the job. I think it is clear that we all resist change for the reason of familiarity, even if the change might be in the direction of doing it the easy way.

PL/9

One of my readers who lives in the Detroit area, called me the other day and said that I should give some programming examples that show why I think PL/9 is so ideal for my programming. Maybe the best way would be to show that you can write an I/O driver for something like a serial port (6850) without resorting

to any assembler code at all. Suppose we have a parallel port at address \$E030, just for an example. Let's say we want to connect a modem to that port and write a PUTMOD and GETMOD function that correspond with PUTCHR and GETCHR of FLEX. First, somewhere near the top of our PL/9 program we define the port and give its data and control registers names:

```
AT $E030 BYTE MOCONTROL,MODATA;
```

This has created two variables, one called MOCONTROL, a single byte at \$E030, and a second called MODATA at the next address \$E031. Of course, having a port defined, doesn't make it work, so we have to initialize it. Here is a procedure to do that:

```
PROCEDURE PORTINIT;  
  MOCONTROL = $3;  
  MOCONTROL = $15;  
ENDPROC;
```

Now a call in the program to this procedure will initialize the port. All that remains is to write the PUTMOD and GETMOD functions:

```
PROCEDURE PUTMOD (BYTE CHAR);  
  REPEAT UNTIL MOCONTROL AND 2 <> 0;  
    MODATA = CHAR;  
  ENDPROC;
```

```
PROCEDURE GETMOD;  
  REPEAT UNTIL MOCONTROL AND 1 <> 0;  
  ENDPROC BYTE MODATA;
```

The definition of the procedure PUTMOD declares that a character will be passed to it by the main program. It first loops until the transmit buffer empty flag is set, and then assigns the value of the character to the variable MODATA, thus outputting the character. Note that the loop does nothing but repeat the test for exit from the loop. In other words, there are no statements included in the REPEAT UNTIL loop, just the test at the end. GETMOD waits for the receive buffer full flag, and then returns the value of MODATA to the calling procedure.

Tests for true and false values have an implied <> 0 for true. "UNTIL MOCONTROL AND 1" therefore is the same as "UNTIL MOCONTROL AND 1 <> 0". Note that the AND is a bitwise AND function. A logical AND is preceded by a dot ".AND". In the main program the two procedures would be used as follows:

```
PORTINIT;  
PUTMOD('A'); /* PUTMOD(65) WOULD DO AS WELL */  
CHAR = GETMOD;
```

Of course the PORTINIT call must precede the use of either PUTMOD or GETMOD. PUTMOD requires a parameter to be passed to it. The parameter should be a character. GETMOD returns a character, which must be assigned to a variable. I should add that in PL/9 BYTE and CHAR are synonymous. A character and a byte are both treated as 8 bit values. Integers are 16 bit values, and REALS are four bytes.

PL/9 allows you to get "closer to the machine" if you wish. It has named the registers of the 6809 as variables. ACCA = 'T' does the same thing as LDAA #T would in an assembly language program. You can embed assembler code in the middle of a PL/9 program if you wish. PL/9 treats each line as a complete entity. After a line of code is executed, the compiler makes no assumptions about the contents of the accumulators. You can do some assembler manipulation and then return to PL/9 code on the next line. PL/9 does use the stack pointer and the Y register internally, and if you use them in your assembler code, they must be saved and restored before proceeding to the next line of PL/9 code. Parameters are passed on the system stack, to a procedure, and the calling

procedure or main program cleans up the stack after the return. Procedures that return values (functions) return the value in the B register (byte), D register (integer) or D and X registers (real).

As in Pascal, a function can only return a single value. Procedures that need to return multiple values (such as rectangular to polar coordinate conversion functions) can do so by means of the calling program passing pointers to the place where the results should be placed (just as in Pascal).

```
PROCEDURE RECT(REAL R,THETA,.X,.Y);
  X = R * COS(THETA);
  Y = R * SIN(THETA);
ENDPROC;
```

The main program passes the radius and angle (polar coordinate form of a vector) and pointers to the two real variables where X and Y (rectangular form) are to be placed. The procedure does the calculations, using the "pointed at" locations to store the results. The calling program would look like:

```
RECT (AMOUNT, ANGLE, .XVAL, .YVAL);
```

The above variables would have to have been defined as REAL variables in the program. The dot "." before the variable name indicates that the ADDRESS of the variable is to be passed to the procedure RECT, and not the contents of the variable. Note that all pointers are 16 bits, and as such the POINTER is an integer. In the definition of RECT above, the word REAL indicates that they are pointers to REAL variables. The type used is the type of the variable to which the pointer is pointing. One other point is to be made. Variables passed to a procedure are handled the same as local variables in that procedure, and as such their values or pointers to them may be passed to other procedures. Procedures in PL/9 may not be nested. That is, a procedure may not be defined within another procedure. However, any procedure may call any procedure declared before it, so that when the program is run, it may get several procedures (subroutines) deep at times. MAIN may call PSTRNG, which may call PUTMOD, etc.

Well, that is certainly enough for one session on PL/9.

#### READER RESPONSE

I continue to get comments from readers on the compiler - assembler debate. This is from Dr. Delbert Franz who has been a consultant in civil engineering and has recently gone into the software consulting area as well.

"Assembly language programming was on the wane until the micros came along with their severely limited memory and speed. Now memory is cheaper and speeds are higher so that the second death of assembly programming can begin. I have no interest in being tied to a specific processor by extensive assembler code. Often the program spends most of its time in only 10% of the code. After the fact optimization is often successful if the program runs too slowly. In my case assembler would make little difference because I primarily work with number crunching programs. Most of the time is spent in the floating point processor."

I wrote the above yesterday. Today I received the next installment of words from Dan Farnsworth, in response to my last response to his last.... You get the idea. I quote Dan's letter directly.

"I generally agree with your rebuttal and only take issue with your use of the "secret code" phrase. If you have the source code to the subroutines they are no longer a secret or a mystery, and if you don't have the source code you couldn't use them anyway. The code that is in my runtime package isn't much more

complicated than OUTCH, or INCH, or PDATA. It is just very convenient to JSR CPDATA and output a CR & LF, then print the message at {X} and another CR & LF. I think you described my system very well when you said that I had written my own compiler, and I might add that the compiler is controlled by assembly language instead of a Syntax.

"One of the most common structures in HLLs is the Loop. This is the FOR - NEXT statement in BASIC. In assembler this could be written as:

```
LOOP LDH #100
  LOOP1 (PROCEDURE)
    DECB
    BNE LOOP1
```

"There is little difference in the amount of typing or entry time, so is there any other advantage of the assembler over Basic? I think so; first, during the procedure you can test for limits such as out of memory, or unstable conditions such as divide by zero, and exit out of the Loop without any side effects. In the HLLs that I am familiar with, this can get you in deep trouble. Second, you may enter the Loop at any point, in effect using the same loop for several similar tasks. I don't recommend that for any HLL.

"A similar case can be made for the Decision structure, IF - THEN - ELSE in Basic. In assembler this would be written:

```
TST SWITCH (any variable, register, CC, etc.)
  BNE PROC1 (THEN procedure)
  PROC2 (ELSE procedure)
```

There are 16 different conditions that can be tested in assembler compared to 6 in Basic. In assembler you can test each bit of the byte, saving both memory and disk space."

#### RON'S NOTE

I can't wait to get this one in. Most HLLs, such as PL/9 and "C" allow such tests as:

```
IF BYTEVAR AND 7 = 7 THEN...
```

That would test for the low order three bits being ones. The point is that we can do the same tests in a HLL very simply. Now to return to Dan's comments.

"The most important advantage gained with the use of assembly language is the saving of memory and disk space. This has a snowball effect. If you have more room you can keep the whole file in memory. If the complete file is in memory you don't have to have a CHAIN structure, saving more memory; also, if the file is in memory it will run much faster and you don't have to output a message such as "PLEASE STAND BY, I AM PREPARING TO RUN YOUR PROGRAM" which saves even more memory.

"The file structure that I use permits both fixed and variable length fields. The fixed fields can store numbers as 2 digits per byte (packed). Variable length fields which are empty only require 1 byte. With this type of file structure my Payroll program can contain a year's records for 1500 employees on one 5" floppy disk (750K). I have seen a payroll program written in Cobol which could only keep 150 employees records on a 5 megabyte hard disk. I have been told that the Apple payroll program can only handle 50 employees per disk.

"Lately we have been seeing advertisements for programs which require a minimum of 128K of Ram and a Hard disk for operation. I can only conclude from this trend that many programmers are just moving programs from Minicomputers down to Micros and are just waiting for the micros to get faster and bigger so their programs will run at an acceptable speed. I have a full screen Editor that uses 8K of RAM, yet Wordstar takes 80K of Disk space and 20K of RAM."

#### MY RESPONSE

I should mention that Dan preceded the above with "if you are going to agree with me, and not make some ridiculous statements, I don't see how we are going to have a big give and take discussion on programming." After the above quote he says "Chop me up in little pieces and I will get back at you in the next go-round." I will say that this little debate or whatever you choose to call it, has brought more reader comments than anything else I have ever written in this column.

First, let me once again indicate that the end use of the computer in my case may not be quite the same as in Dan's. My applications are generally in a stand-alone environment, controlling some mechanical device or measuring some input signal. I have no need for disk access since there is no disk drive in the end use of my programs. (I am speaking of my work in this comment).

My JUST program (see Southeast Media ad) is written in PL/9. It is slightly over 4K in length, and the listing is about 15 pages. It processes a line of text at a time, so that the RAM requirement other than for the program is trivial. So what if I could write it in Assembler and end up with a 2.5K to 3K program? It runs fast enough to keep up with most any printer that anyone would use for text.

The remainder of my rebuttal will boil down to two points; universality, and clarity or readability. Certainly the (procedure) in Dan's examples above will be a few lines to a few hundred lines of code. The procedure portion of the code in "C" or PL/9 could conceivably be a page of code. The higher level languages encourage making that procedure a separate "subroutine" or "function" or "PROCEDURE" (all equivalent in the various languages). Isn't the following clearer?

```
IF CHAR <$20
  THEN DOCONTROL.
  ELSE PUTCHAR(CHAR); /* PL9 CODE */

for (i=1: i<=100: i++)
{
  procedure statements
}
```

The first example is PL/9 code. DOCONTROL would of course be a procedure somewhere above that code in the program to handle a control character.

The second example is a "C" for - next loop. The information in the parentheses includes from left to right, initial value for index, condition for remaining in the loop, and increment for index. "i+=3" indicates incrementing the loop by 1. "i+=3" would mean to increment by 3. Since "C" is a standard language, my loop written as above will run in a 68000 based system, a Z-80 based system, or for that matter any system for which a "C" compiler exists. If the disks aren't compatible, I can get my source text file from one system to the other via a Modem!

```
FOR N:=1 TO 100 DO
  BEGIN
    (statements)
  END;
```

There you have it in Pascal, another language that is available for almost any processor. That loop is therefore universal. Compare the "C" and Pascal versions. You will see that Pascal spells it out more readably, and "C" uses more of a shorthand notation. You have your choice.

I use PL/9 in my work, primarily because I am concerned more with efficient code generation than universality. PL/9 is efficient because it DOESN'T do a lot of internal checking. Define an array with a dimension of 100 and PL/9 reserves 100 locations. The index may vary from 0 to 99 (not 100). Now access array(200) and PL/9 won't complain, but your program will probably bomb. PL/9 is a lower level language than Pascal, and about on the same level as "C". Add 32767 to 32767 in either (using integer variables) and you will get -2. You will have generated a signed arithmetic overflow in the addition. Both C and PL/9 ignore overflow errors. The programmer has to know what he is doing!

You might think that is all bad. First of all, consider the fact that assembler code does no checking at all, unless you code the checking as part of your program. Secondly, if you have a FOR NEXT loop for VAR = 1 to 10, you hardly need to check VAR for overflow each time you increment it in the loop! There are many cases where checking is absolutely unnecessary. In the few where it is necessary, you can code it in as part of your program in PL/9 or "C". By the way, "C" doesn't care if you access an array with an out of range index either. In fact you can even use array(-3) in "C". If you know what you are doing, you might be able to take advantage of that to gain some efficiency. Don't try such tricks in Pascal, however. It will instantly tell you you made an error! It is a higher level language. The error checking costs some code, but is worth having if you need it, for example to check user input information. In my machine applications, the input is from an Analog to Digital converter and the range of values is completely predictable so error checking is unnecessary and would slow down the program operation needlessly.

I have a program that I was just looking at today. I wrote a machine program in Assembler some time ago. I decided to use 16 bit integer arithmetic and force a fixed decimal point three places from the right. That makes my minimum number 0.001, and my maximum 32.767. Of course I can have both positive and negative values in that range, and zero is a valid number. I did the whole program in 2K, and found that I was always exceeding the number range when I made any change in the program. I would always have to go back and re-scale things to make it work again. The listing is 25 pages.

I rewrote the program in PL/9 and it was reduced to 7 pages of highly readable program. I gained the use of a 7 digit floating point math package and scientific functions good to 7 places rather than my crude approximations in the assembler version that were good to 0.5% or so. I gained the possibility of formatted output of numbers through modifying one of the supplied library programs that allowed printing of numbers:

```
PRINTR(VALUE,6.2);
```

That would output the value of a floating point number in a field of 6 columns, with the two digits after the decimal point. I had to write a lengthy routine in assembler to do the same thing. The PL/9 compiler actually compiles the PL/9 program faster than the assembler assembles the assembler program, even though with all the floating point math package and added convenience features, the PL/9 program runs almost 6K. Note that I am not saying that the PL/9 compiler generates three times as much code as if I had used assembler. If I had to write a program with equal capabilities to the PL/9 program in assembler, I would first add my floating point math package and sci functions, about 2K, etc. I doubt that the PL/9 code would be more than 30% larger than the assembler code if the programs had equal performance.

Dan made one other point about multiple entry points in a subroutine in Assembler. I'll amplify on

his remark and explain what he meant. Let's go back to 6800 code. Suppose you want to increment the X register some variable number of times:

```
INCRX8 INX
INCRX7 INX
INCRX6 INX
INCRX5 INX
INCRX4 INX
INCRX3 INX
INCRX2 INX
INCRX1 INX
RTS
```

Now if we want to increment X by 4 we JSR INCRX4. If we want to increment it by 8 we JSR INCRX8. That is a very clever and efficient way to do the increment with a limited instruction set like the 6800 one. In 6809 code we wouldn't need a subroutine at all.

```
LDB #4
ABX
or
LEAX 8,X
```

These would do the same job. This is a simple example of a multiple entry point subroutine. In PL/9 of course you wouldn't be incrementing a processor register directly, but perhaps an analogy would be a variable delay time procedure:

```
DELAY (BYTE COUNT);
  WHILE COUNT > 0 COUNT = COUNT - 1;
ENDPROC;
```

To call the delay procedure in a program we would use:

```
DELAY(10);
or
DELAY(255);
```

Dan describes his file structures. The descriptions essentially fit FLEX Sequential files and Random Access Files. Sequential files have variable length fields. Random Access Files have fixed length fields.

In one area, I can't disagree. Dan mentions the ads for programs that require 128K of RAM and a Hard disk for operation. There is no doubt that some of the early compilers for Microprocessor based computers WERE very inefficient. Some of those are still around. The point is that compilers are not all alike. I'm not advocating using just anything that happens to be laying around, but I am saying that GOOD, EFFICIENT, FAST compilers do exist in a variety of languages, and that no one is going to convince me that he can write 30 pages of assembler code and debug it as fast as I can write 7 or 8 pages of compiler source code and debug my program. I know that I can get my program written and debugged three or four times as fast as the assembler programmer doing the equivalent program. If a bug does show up for a particular condition, I can generally pinpoint it and have it repaired in a few minutes.

Well, I think I have said enough. I'll let Dan have the last word, since I started this debate. Dan, go ahead and reply to this and I'll get it in a column in a couple months.

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# OS9 USER NOTES

By: Peter Dibble  
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Rochester, NY 14620

## Big System Hardware

Gimix has offered CoCo owners an attractive deal. Gimix will accept a CoCo in trade for a Gimix system at 110 percent of its value. Even with this roughly thousand dollar break in the price of a Gimix the upgrade is expensive, but, speaking as a person who has used a Gimix for many many hours, if you can find the money, take this opportunity. What makes it worth thousands of dollars to move from a CoCo to a SS50 system? The most important difference is that everything works right on the larger systems. Another is that the more expensive systems are faster. A two megahertz 6809 runs more than twice as fast as a CoCo in its normal mode. The DMA disk controller and other powerful I/O devices also make a noticeable difference.

The upgrade from a CoCo to a SS50 system isn't the end of the line. All the major SS50 systems that support OS-9 support both OS-9 Level One and Level Two. The move to Level Two involves a new version of the OS-9 operating system, but no change in applications programs. All the modern SS50 systems I know of can be upgraded with little or no change to the hardware (the main requirement is memory management hardware). I imagine that OS-9 Level Two might run with the 56K of memory that Level One uses, but just barely. Level Two begins to come into its own at 128K. At 344K, I have never run out of memory.

## Big System Software

There is a bit of controversy arising in the OS-9 world. Smoke Signal Broadcasting has been responsible for a lot of 6809 software over the years. There is even an operating system which they are responsible for. Now they are contributing to OS-9 software. My understanding is that Smoke commissioned someone to work on the version of OS-9 licensed to them. Their consultant made OS-9 less modular in order to improve its performance. The Smoke users I know confirm that the revisions make the Smoke version of OS-9 run faster than it used to. Running faster would seem to be an advantage, but the changes Smoke has made turn out to be a mixed blessing. There appear to be subtle incompatibilities between OS-9 as it comes from Microware and OS-9 from Smoke Signal Broadcasting. I have spoken to Microware and they say that they can't support Smoke's version of OS-9 (that may have changed by the time you read this). I have had trouble exchanging software with Smoke users.

The Smoke users are amazingly tolerant. I have read exchanges on the Compuserve OS-9 SIG in which Smoke users exchange tips on ways to prevent the DIR command from intermittently producing junk.

I certainly approve of improving OS-9's performance, but it is very important that an operating system be as standard as possible. If I were buying a system from Smoke Signal Broadcasting, I would want strong assurances that their version of OS-9 was compatible with Microware's on every level. A good test would be that all applications programs and system modules that run under standard OS-9 should run under the modified one, and vice versa.

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## The Compuserve OS-9 SIG

The OS-9 Special Interest Group on Compuserve is booming. Messages flow through the bulletin board so fast I am beginning to question my ability to read them all. Many experienced OS-9 users regularly check in, but it is a particularly good resource for newcomers. I strongly suggest that you join Compuserve if there is an access point close to you. It is worth it even if you only use it to access the OS-9 SIG.

## OS-9 on the Color Computer

I have been saying nasty things about Tandy which aren't true. I blamed the sloppy programming in the C64DISK device driver on Tandy when it seems the blame should fall on Microware and Microsoft. The bootstrap for the CoCo is in ROM. There is only one bootstrap ROM, designed by Microsoft for use with Color Disk Basic (I guess). Microware had to design the CoCo implementation of OS-9 so it could be loaded with that Bootstrap. The CoCo boot ROM reads 15 sectors off track 35 into a fixed location in memory. The OS9Root file had to fit into those 15 sectors. This memory constraint forced Microware to pay even more attention to writing compact code than they usually do. Since 6809 instructions that do direct memory references take less memory than indexed instructions, Microware used them whenever they could. Since versatile device drivers take more memory than limited drivers, they wrote limited drivers. Tandy, I apologize for the nasty thoughts I sent your way.

I decided to write this month's project for the CoCo. I noticed that Color Basic has a number of commands which make assorted honks and beeps emerge from my TV. BASIC09 has no way to make those noises. I checked the "Color Computer Technical Reference Manual" for information about the sound generator, and found that the Color Computer generates sound with a Digital to Analog converter. The output from the D/A converter is routed through an analog multiplexer to the modulator, and hence to the TV. It looked like OS-9 could learn to make noise.

I expect that the reason Microware didn't include sound generation in their OS-9 for the Color Computer is that sound generation with a D/A converter is a very time dependent operation. A note is played by gradually (in computer terms) raising and lowering the voltage generated by the D/A converter. This has to be done with a timing loop in a program. The timing loop must have exclusive use of the computer, or the rate at which the voltage rises and falls will vary causing the note being generated to rise and fall. Some people might find the resulting yodel surprising. A program can give itself exclusive use of the computer by masking out interrupts, but locking out interrupts for more than a few millionths of a second is antisocial behavior for any program -- even a part of the operating system.

Still, the ability to at least be able to generate a beep seems important to me. I started by writing a program called Sound to investigate sound production. The program generates a saw-tooth wave that sounds rather like a saber saw cutting thin plywood, but it works. The most important discoveries I made while writing Sound were how to initialize the multiplexer so the D/A converter's output would be routed to the TV. The control registers at \$FF03 and \$FF23 both need to be modified. The fact that they could be modified was another interesting discovery. I am used to control registers being either readable or writeable. These registers are to some extent read/write. CoCo

programmers may take this for granted, but I was pleasantly surprised.

Once the control registers are set, sound can be generated by simply writing different values into the most significant 6 bits of the byte at \$FF20. The faster the value is changed the higher the pitch. I wrote the program to send 1000 waves, then stop.

There is lots of room for improvement in Sound. The quality of the note created by the program could be improved, and the program might even be made to play a song. I decided to drop Sound and work on building a Device Driver for the D/A converter.

The Device descriptor I wrote for the D/A converter, Beep, is almost as small as a Device Descriptor can be. The D/A converter is not a random access device so I decide to use the SCF file manager to drive it. There are no options except the one byte which indicates that it is a SCF device. There are three addresses in the descriptor. Normally a descriptor only needs one port address, but in this case, since the three addresses used in making the D/A converter make sound aren't related, I included all the addresses explicitly.

The Device Driver, called Beep, is not interrupt driven. Most OS-9 device drivers use interrupts to give them a way to avoid wait loops, but I couldn't find a way to get the D/A converter to generate interrupts. In this case interrupts weren't necessary; the device responds as fast as data can be pumped into it.

The initialization entry puts some values that will be needed in the termination routine into device static storage, and sets the two PIA registers that need to be adjusted to permit sound to be made. The termination entry sets the two control registers back the way they were before Beep started, and the GetStat and PutStat entries don't do anything at all. The read and write entries deal with the fact that the D/A converter only uses the high-order six bits of the register it is accessed through.

#### Installation of Beep/Beeper

Beep and Beeper have to be typed in and assembled. As usual, the USE statements between the IFPI and ENOC don't come out in the assembly listing. You will have to include use statements for both OS90EFS and SCFDEFS for these programs. When you assemble the Beep file it will generate a file in the execution directory called Beep with both Beep and Beeper in it.

To use Beep first load it with the OS-9 command line:

OS9: load beep then link beep with the command line:

OS9: link beep Since Beep is the second module in the file it will have a tendency to disappear if you don't link it.

As a first try you can get a low growl out of your computer by listing a file to /Beep. I used OS9: list beep >/beep

To get a more interesting sound out of the device you will need to feed it meaningful data. The Basic09 program called TestBeep generates a thousand bytes of sin wave. TestBeep is intended to be packed and run out of the execution directory. If it is run from source the BYE should be removed. It takes a long time to initialize the array, so be

patient. The wave can be sent one byte at a time with a loop like:

```
for i=1 to 1000
    put Sound,note(i)
next i
```

But OS-9 doesn't do very well at outputting a single character at a time. This program segment demonstrates that by generating a low, raspy note. To get a higher, smoother note I sent the entire thousand-byte array with one write. The quality of the tone still leaves a lot to be desired, but it's the best I could do quickly.

#### Applications for /Beep

I imagine that the timbre of the tone generated by TestBeep could be improved by spending more time with the wave form: the rough sin wave I use is pretty crude. Certainly the pitch can be varied by changing the frequency of the wave. I discovered that TestBeep just as it stands is a useful demonstration of OS-9's multitasking behavior. I started TestBeep with the command line:

OS9: BASIC09 TestBeep& If you have RUNB

OS9: TestBeep& will work fine. This runs the program as a background task. When the noise started, I ran a variety of different programs and noticed the effect on the sound.

If you want to generate a higher pitch than you can get out of Beep, I suggest doing more work in the device driver. The approach I have in mind is to add a buffer in the device static storage for Beep. When Beep receives a request to write a zero value it will load the next 256 bytes written into the buffer. When the buffer isn't being loaded, each value written to Beep will indicate a number of times to send the buffer out the D/A. I believe that this approach will prove to be really useful, especially if there is a default wave loaded into the buffer by the INIT code.

#### The Users Group

I hope all the members of the OS-9 Users group will have their disks by the time you read this. I am afraid that some of you will have received the wrong type of disk. I am responsible for this. We don't have any record of the type of disk (size and format) any of our early members use. Some of the people who have joined recently have included information about their disk, but in most cases I have had to guess. If you get a disk you can't deal with, write to the Users Group address, and we will try to get you a disk you can read.

		name	Sound
00001			
00002		ttl	Sound generator for CoCo
00003		IFPI	
00004		ENOC	
00006 0011	TYPE	SET	PROGRAM,OBJECT
00007 0000 B7CD0005		REG	ENDSMO,NAME,TYPE,REENT+1,ENTRY,BSIZE
00008 B 0000	CNTL	REG	2 Address of D/A control register
00009 B 0002	CNTL2	REG	2 Address of another D/A control
00010 B 0004	PORT	REG	2 Address of D/A input
00011 B 0006	CNTA	REG	2 Number of waves to send
00012 0 0008	CNTLV	REG	1 Initial value of first Control
00013 B 0009	CNTLV2	REG	1 Initial value of other control
00014 0 0004	REG	200	STACK
00015 B 0002	BSIZE	EDU	*
00016 0008 534F554E	NAME	FCS	/SOUND/
00017 0012	ENTRY	EDU	*
00018	*****		
00019	*	Initialize addresses in local storage	
00020	*		
00021 0012 CFFF23		LOD	0FFF23
00022 0015 D000		STD	CNTL
00023 0017 CFFF20		LOD	0FFF20
00024 001A 3004		STD	PORT

```

00025 001C CCFF03        LDD  0FFF03
00026 001F 0002        STB  CNTL2
00027 00000000
00028 * Save initial values of control registers
00029 * and set them to route D/A output to sound
00030 *
00031 0021 A604        LDA  [CNTL,U]
00032 0023 9708        STA  CNTLV
00033 0025 8000        DRA  8000
00034 0027 A704        STA  [CNTL,U]
00035 0029 460002        LDA  [CNTL2,U]
00036 002C 9709        STA  CNTL2V
00037 002E 84F7        ANDA  0FFF-000
00038 0030 A70002        STA  [CNTL2,U]
00039 00000000
00040 * Initialize the counter
00041 *
00042 0033 CC03E8        LDD  81000
00043 0034 D006        STO  CNTR
00044 00000000
00045 * Send waves
00046 *
00047 0038 0000        LOOP2
00048 0038 B600        LDA  80
00049 00000000
00050 * Send each wave
00051 *
00052 003A 0000        LOOP1
00053 003A A7D004        STA  [PORT3,U]
00054 003B B804        ADDA  14
00055 003F 12        NOP
00056 0040 12        NOP
00057 0041 12        NOP
00058 0042 12        NOP
00059 0043 12        NOP
00060 0044 12        NOP
00061 0045 12        NOP
00062 0046 12        NOP
00063 0047 12        NOP
00064 0048 B100        ENPA  80
00065 004A 26EE        SNE  LOOP1
00066 00000000
00067 * End of sending one wave.
00068 * See if we still need to send more
00069 *
00070 004C D006        LDD  CNTR
00071 004E B30001        SUDD  91
00072 0051 D006        STO  CNTR
00073 0053 26E3        BNE  LOOP2
00074 00000000
00075 * Restore initial values to control registers
00076 *
00077 0055 9608        LDA  CNTLV
00078 0057 A7D4        STA  [CNTL,U]
00079 0059 9609        LDA  CNTL2V
00080 005B A70002        STA  [CNTL2,U]
00081 005E 5F        CLR8  clear carry
00082 005F 103F06        OS9  F8E1T  return to 08-9
00083 0062 528D69        ENOD
00084 0063 0000        ENDSND  EQU  *
00000 error(s)
00000 warning(s)
$0015 00101 program bytes generated
$00B2 00210 data bytes allocated
$0EF8 03832 bytes used for symbols

TTL DEVICE DESCRIPTOR
MMR BEEP
TYPE SET DEVIC+OBJCT
MOD BPREND,BPRNM,TYPE,REENT+1,FMNAME,DRVNAME
FCB READ,+WRITE, MODES
FCB 8FF,8FF,820 PORT ADDRESS

FCB OPTL Length of options section
OPTIONS B00+4
FCB DT,SCF
OPTL EQU 4-OPTIONS

CNTL1 F0B 8FF23 address of control byte 1
CNTL2 F0B 8FF03 address of control byte 2

BPRNM FCS /BEEP/ name of this module
FMNAME FCS /SCF/ File Manager name
DRVNAME FCS /BEEPER/ Device driver name
ENDO
$PEND EQU 4

MMR BEEPER
[FP]
USE /MD/DEFS/OS9DEFS.1
USE /HD/DEFS/091odef.s.1
USE /MD/DEFS/09SCFDEFS.1
ENDC
USE BEEP Device Descriptor
TTL DEVICE DRIVER FOR D/A
PAG
TYPE SET DRIVR+OBJCT
REVS SET REENT+1
MOD BPREND,BPRNM,TYPE,REVS,ENTER,MSIZE
FCB READ,+WRITE, DRIVER MODE
BPRNM FCS /BEEPER/
FCB 1 EDITION
000000000000
* Device Static storage
*
ORG V,SCF System part of Static Storage
00000000
* Local part of static storage
*
PORTA RMB 2 PORT ADDRESS
CTL1V RMB 1 HOLD CNTL1 VAL
CTL2V RMB 1 HOLD CNTL2 VALUE
CTL1A RMB 2 HOLD CNTL1 ADDR
CTL2A RMB 2 HOLD CNTL2 ADDR
MSIZE EQU 4

000000000000
* Entry vectors
*
ENTER-
LDR4 INIT
LDR4 READ
LDR4 WRITE
LDR4 GETSTAT
LDR4 PUTSTAT
LDR4 TERM
SPC 1
INIT
000000
* U ADDRESS OF DEVICE STATIC STORAGE
* Y ADDRESS OF DEVICE DESCRIPTOR MODULE
*
LDI CNTL1,Y Get control address 1 out of Descriptor
STX CTL1A,U Save the address
LDA ,I Get the present value of cntl1
STA CTL1V,U save it for later restore
ORA 8000 set it for sound
STA ,I

LDI CNTL2,Y do the same stuff for cntl2
STX CTL2A,U
LDA ,I
STA CTL2V,U
ANDA 0FFF-000
STA ,I

CLR8 CLEAR CARRY
RTS RETURN
SPC 1
READ
00000000
* U ADDRESS OF DEVICE STATIC STORAGE
* Y ADDRESS OF PATH DESCRIPTOR
* RETURN CHARACTER READ IN A
*

```

LDI V.PORT,U port address from device descriptor  
LDA ,I D/A value  
LSRA  
LSLA Shift out low order bits  
CLRB Clear carry  
RTS  
nop 1  
WRITE  
\*\*\*\*\*  
\* U DEVICE STATIC STORAGE  
\* Y PATH DESCRIPTOR  
\* A VALUE TO WRITE  
\*  
LBI V.PORT,U  
LSLA Shift out high order bits  
LSLA  
PSHS A save value to write  
LDA ,I Get current value at Port  
ANDA #000000011 clear D/A value  
ORA ,S+ put value to write in  
STA ,I send it  
CLAB  
RTS RETURN  
nop 1  
GETSTAT  
PUTSTAT  
CLRB  
RTS  
TERM  
\*\*\*\*\*  
\* U DEVICE STATIC STORAGE  
\*  
(LDI CTL1A,U restore original Cntl1 value  
LDA CTL1V,U  
STA ,I  
LDI CTL2A,U restore original Cntl2 value  
LDA CTL2V,U  
STA ,I  
CLAB clear carry  
RTS  
END  
PRE EDU +

00001	NAME	BEEPER					
00002		[FPI]					
00006	ENDC						
00007	USE	DEEP Device Descriptor					
00008	TYL	DEVICE DESCRIPTOR					
00009	RAM	DEEP					
00010	00F1	TYPE	SET DEVICE-OBJECT				
00011	0000 07C00027		MOD /PEX0,UPMAN,TYPE,REENT+1,FILENAME,BRVMAN				
00012	0000 03		FCB READ.+WRITE. MODES				
00013	000E FFFF20		FCB SFF,6FF,\$20 PORT ADDRESS				
00014							
00015	0011 01		FCB OPTL Length of options section				
00016	0012	OPTIONS	EDU *				
00017	0012 00		FCB DT.SCF				
00018	0001		EDU *-OPTIONS				
00019							
00020	0013 FF23		CTL1I FDB 0FF23 address of control byte 1				
00021	0013 FF03		CTL1L FDB 0FF03 address of control byte 2				
00022	0017 42454500		BRVMAN FCS /BEP0/ name of this module				
00023	0018 5343C6		FILENAME FCS /SCF/ File Manager name				
00024	001E 42454550		BRVMAN FCS /BEEPER/ Device driver name				
00025	0024 58AEA3		EROD				
00026	0027		BPEX0 EDU *				
00027			TTL DEVICE DRIVER FOR B/A				
00028	00E1	TYPE	SET DRIVER-OBJECT				
00029	0081	REVS	SET REENT+1				
00030	0000 07ED00076		MOD /PRED,UPMAN,TYPE,REVS,ENTER,MEMSIZE				
00031	0003 03		FCB READ.+WRITE. DRIVER MODE				
00032	000E 42454550		BRVMAN FCS /BEEPER/				
00033	0014 01		FCB I EDITION				
00034	*****						
00035	*	Device Static storage					
00036	*						
00037	0013	ORG V.SCF	System part of Static Storage				
00038	*****						
00039	*	Local part of static.storage					
00040	*						

00041 D 001D PORTA RMB 2 PORT ADDRESS  
00042 D 001F CTL1V RMB 1 HOLD CTL1 VAL  
00043 D 0020 CTL2V RMB 1 HOLD CTL2 VALUE  
00044 D 0021 CTL1A RMB 2 HOLD CTL1 ADDR  
00045 D 0023 CTL2A RMB 2 HOLD CTL2 ADDR  
00046 D 0025 MEMSIZE EQU \*

00047  
00048 \*\*\*\*\*  
00049 \* Entry vectors  
00050 \*  
00051 0015 ENTER  
00052 M 0015 16000F LBRA INIT  
00053 M 0018 16002C LBRA READ  
00054 M 0018 160031 LBRA WRITE  
00055 M 001E 16003E LBRA GETSTAT  
00056 M 0021 16003B LBRA PUTSTAT  
00057 M 0024 16003A LBRA TEAM  
00058 0027 INIT  
00059 \*\*\*\*\*  
00060 \* U ADDRESS OF DEVICE STATIC STORAGE  
00061 \* Y ADDRESS OF DEVICE DESCRIPTOR MODULE  
00062 \*  
00063 0027 AEAB13 LDI CTL1I,Y Get control address I out of D  
00064 002A AFCB21 STA CTL1A,U Save the address  
00065 0020 A6B4 LDA ,I Get the present value of cntl  
00066 002F A7CB1F STA CTL1V,U save it for later restore  
00067 0032 BAOB ORA 0800 set it for sound  
00068 0034 A7B4 STA ,I  
00069  
00070 0036 AEAB15 LDI CTL12,Y do the same stuff for cntl2  
00071 0039 AFCB23 STA CTL2A,U  
00072 003C A6B4 LDA ,I  
00073 003E A7CB20 STA CTL2V,U  
00074 0041 B4F7 ANDA 08FF-B0B  
00075 0043 A7B4 STA ,I  
00076  
00077 0045 5F CLR8 CLEAR CARRY  
00078 0046 39 RTS RETURN  
00079 0047 READ  
00080 \*\*\*\*\*  
00081 \* U ADDRESS OF DEVICE STATIC STORAGE  
00082 \* Y ADDRESS OF PATH DESCRIPTOR  
00083 \* RETURN CHARACTER READ IN A  
00084 \*  
00085 0047 AE41 LDI V.PORT,U port address from device descr  
00086 0049 A6B4 LDA ,I D/A value  
00087 004B 44 LSRA  
00088 004C 44 LSRA Shift out low order bits  
00089 0040 5F CLRB Clear carry  
00090 004E 39 RTS  
00091 004F WRITE  
00092 \*\*\*\*\*  
00093 \* U DEVICE STATIC STORAGE  
00094 \* Y PATH DESCRIPTOR  
00095 \* A VALUE TO WRITE  
00096 \*  
00097 004F AE41 LDI V.PORT,U  
00098 0051 48 LSLA Shift out high order bits  
00099 0052 48 LSLA  
00100 0053 3402 PSHS A save value to write  
00101 0055 A6B4 LDA ,I Get current value at Port  
00102 0057 8403 ANDA #000000011 clear D/A value  
00103 0059 BAE0 DRA ,S+ put value to write in  
00104 005B A7B4 STA ,I send it  
00105 0058 5F CLRB  
00106 005E 39 RTS RETURN  
00107 005F GETSTAT  
00108 005F PUTSTAT  
00109 005F 5F CLR8  
00110 0060 39 RTS  
00111 0061 TERM  
00112 \*\*\*\*\*  
00113 \* U DEVICE STATIC STORAGE  
00114 \*  
00115 0081 AFCB21 LDI CTL1A,U restore original Cntl1 value  
00116 0064 AFCB1F LDA CTL1V,U  
00117 0067 A7B4 STA ,I

```

00118 0069 AECB23    LDI  CTL2A,U  restore original Cnt12 value
00119 006C A6CB20    LDA  CTL2B,U
00120 006F A784    STA  ,I
00121 0071 5F    CLRB
00122 0072 39    RTS
00123 0073 A1B2B1    ENOB
00124 0076    BPREWB EDU +

```

```

$0000 errors($)
$0006 warnings($)
$009B 00157 program bytes generated
$000B 00008 data bytes allocated
$164B 05707 bytes used for symbols

```

```

PROCEDURE TESTBEEP
0000    BIN NOTE(1000):BYTE
000C    BIN I:INTEGER
0013    DIM SOUND:INTEGER
001A    OPEN OSOUND,"/BEEP":WRITE
002A    FOR I=1 TO 1000
0038        NOTE(I)=32*I+SIN(I)
0052    NEXT I
0059    FOR I=1 TO 100
0068        PUT OSOUND,NOTE
0077    NEXT I
0082    BYE

```

## "C" User Notes

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Ahhhh. Finally. Some time to sit down at the keyboard and get out a column before you folks start to think I've quit. It's been really hectic the past few months. My schedule just doesn't allow enough time to both develop programs and write columns. Since programs run computers and not columns, I've spent the last month getting the modem program going.

I've also run across a couple of bugs in the Windrush compiler and have received the new Introl version 1.5 compiler. I'll start with my Windrush problems, touch on the new Introl compiler and finally get around to the modem program.

### WINDRUSH BUGS

The first bug I found was that static float initialization was broken; the second "bug" was that their implementation of `getchar()` and `gets()` left a lot to be desired. You probably wouldn't have run across the first bug unless you're into more advanced programming; but the second bug has probably caused you problems if you're doing any serious work with the compiler at all.

These bugs, along with a couple of other things that turned out to be different interpretations of the standard than I've previously seen, were duly reported to Windrush and James McCosh.

Well, it took a few weeks, but yesterday I got a letter from James which contained an explanation of his interpretation of some implementation details and a promise that the real bugs would be fixed.

I won't bore you with all the details, but it essentially boils down to the fact that developmental work on the compiler is done under Uniflex and then transported over to FLEX. Since Uniflex and FLEX present vastly different programming environments, some bugs crept in.

So it looks like Windrush is continuing to provide the level of support that they have in the past and that we have come to expect of them.

### INTROL VERSION 1.5

Introl is now shipping version 1.5 of their compiler. For all practical purposes, this is a completely new package. In talks with Rich Pennington, chief architect of the package, I was told that something like 20,000 new lines of code went into the package. This translates into improvements in the compiler in terms of code speed and density as well as new compiler options and brand new support programs such as the assembler, linker and librarian.

The old assembler has been replaced with a real relocating assembler. The linker has been updated and split into two sections; a linker and a loader. And there is a new librarian with a lot more features than the old one.

The documentation is really well done with a quick intro and overview to get you started, followed by more detailed sections on each aspect of the package.

I have not had many opportunities to play with it. What little that I have used seems to go ok. There was one minor hitch with the `#include` directive. I used

```
#include "O.STDIO.H"
```

but it couldn't seem to find the file, so I got around it by copying STOIO.H onto the working disk and using

```
#include "STDIO.H"
```

As of this writing, I have not called them about it so it might even be fixed by now.

The modem program and some of the other support programs that will be published in this series were all compiled using this compiler.

No rating yet since I want to wait until I've done more testing and have had a chance to get some inputs from other Introl users that I know. A more complete review will come in a later column.

### MODEM9

After much dawdling and many interruptions, MODEM9 is done. This is a program based on the XMODEM protocol developed by Ward Christensen which is now in the public domain. It is a nice protocol since data is transferred in packets with retries if errors are encountered.

This particular protocol was picked for MODEM9 because it is probably the one of the most widely used; by virtue of being the standard for RCPM (Remote CPM) bulletin boards. Why would we want to use it in the 6809 community? The first reason is that it seems to work well and I am unaware of any other widely accepted standard within our camp. However, having made that statement, I'll probably get a lot of mail telling me that I'm all wrong. Secondly, it allows us to log into the many (1) RCPM's around the country and pick up a lot of programs in source form; which we can then adapt to our systems.

There is also a growing number of "cnodes", which are bulletin boards dedicated (for the most part) to the C language and containing many interesting programs. What is available? I checked into the nearest cnode in my area. It had 24 "libraries" of C programs. I scanned a few of these libraries and here is a small portion of what I found.

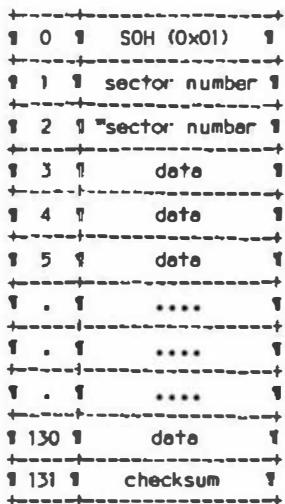
games	from action oriented to adventures
ed	the Small-C editor from Dr. Dobbs
llisp	a lisp like object oriented language
roff	a text processor similar to TSC's
utilites	utilites galore

On most RCPM's you will find a mix of languages such as 8080/280 assembler, Pascal and BASIC. We may not be able to use it directly, but much of it can be adapted so why shouldn't we join the fun.

## XMODEM PROTOCOL.

The xmodem protocol is based on sending 128 byte data packets. Each data packet is preceded by a header section and trailed by a simple longitudinal checksum. If a packet is received without error, it is acknowledged and the next packet is sent; otherwise the same packet is resent.

The packets size of 128 bytes was (presumably) picked because it was the size of a CP/M disk sector. The header section consists of three bytes, ASCII SOH, the sector number and its one's compliment. This is shown pictorially below:



Sector numbers start at 1, but rollover to 0 on the 256th sector. All data, the sector number and the checksum are sent as 8 bit data with no parity and one stop bit. The ACIAS (or UARTS) at both ends must be initialized accordingly. No restrictions are put on the actual data. It can be code or text. The handshaking codes used by the protocol are ASCII control codes and have the following meanings:

SOH	0x01	start of sector
EOT	0x04	no more data (end of file)
ACK	0x05	no error in sector
NAK	0x15	error in sector
CAN	0x18	stop the transfer

File transfers are essentially "receiver" driven. That is, the computer receiving the file controls information flow. The sending program waits for about a minute, or until it gets an initial NAK from the receiver. It then sends a packet and waits for the response. If the response is ACK, then it sends the next sector. If the response is NAK, or any other spurious response, then the same packet is resent. The sender finally sends an EOT to signify that no more sectors are available.

Here is a typical dialog between a sender and a receiver, including some errors, that shows how the protocol is driven by the receiver. It is excerpted from a bulletin board file authored by Ward Christensen.

sender	receiver
waits for one minute or until NAK received	
	timeout after 10 sec.
	<--- NAK
packet #1	--->
	<--- ACK

packet #2	---> (data byte gets hit)
	<--- NAK
packet #2 (retry)	--->
	<--- ACK
packet #3	--->
(ack gets hit)	<--- ACK
packet #3 (retry)	--->
	<--- ACK
EOT	--->
	<--- ACK

It's really the one minute wait by the sender that allows the receiver to timeout and send the initial NAK making the protocol effectively receiver driven.

## HARDWARE REQUIREMENTS

MODEM9 was designed to work with any terminal. Except for the statement that clears the screen, which is for an M19, it expects nothing more than a tty. The ACIA used for the modem is expected to be a 6850 with both its transmit and receive clocks running at 16 times 1200 baud. This allows the program to change the baud rate from 1200 to 300 baud. No interrupts are used. The program is used here regularly at 1200 baud with no trouble.

The program contains its own printer driver routines for a 6821 PIA based parallel port.

No modem control functions such as autodial are built in. It assumes that you will do all of that sort of stuff by hand.

Customizing it for your system should involve only changing the clear screen (or deleting it) and setting the #define's for your port addresses. If you use a serial printer, you might even be able to use the terminal drivers for the printer.

## PROGRAM ORGANIZATION AND USE

The program is composed of 4 modules. These are:

modem.h	header file
modem1.c	main program and terminal mode
modem2.c	xmodem send/receive functions
modem3.c	hardware drivers

The program has been compiled, essentially unchanged, with the Introl V1.4, Introl V1.5 and Windrush compilers. If you are using the Windrush compiler you will have to take all the global variables out of modem.h and properly declare them in the other files.

The program comes up in the command mode. From the command mode you can enter the other modes or change various program parameters. A brief description of the commands follows. Commands that need more input prompt the user for it.

### 8 baud

— Change the baud rate of the modem port.

### Capture

— Toggle the capture buffer on and off.

### Download

— Receive a file from the host computer using the XMODEM protocol.

### Erase

— Erase the capture buffer.

### File

— Set up what kind of file will be sent/received using the XMODEM protocol.

## Help

— List out all the commands to the console.

## Keep

— Save (keep) the capture buffer in a file and then erase it.

## List

— List out the capture buffer to the console.

## Print

— Print the capture buffer to the parallel printer.

## Quit

— Return to FLEX.

## Settings

— List out all the present parameter settings.

## Terminal

— Enter the terminal emulator mode. To escape hit hit NULL, which is control-shift-2.

## Uload

— Send a file to the host computer using the XMODEM protocol. Upload will prompt you for a file name.

## View

— Turn on the viewing option to see incoming or outgoing data when using the XMODEM protocol.

More needs to be said about the terminal mode. In most of the versions that I have run across, commands are issued while in the terminal mode. This necessitates using control codes for the commands. I felt that this was bad. Many editors available on big systems use control codes as part of their command set. If you use MODEM9 to log into your work account, having the MODEM9 commands as control codes could impact the usefulness of your editor. Those of you who use EMACS will appreciate what I mean.

This implementation of the terminal mode uses the NULL code to escape back to the command mode. Because the NULL code is rarely used for anything other than padding it's a pretty safe code to use. All other codes go to the host unfiltered.

## ACCESSING HOST COMPUTERS

MODEM9 is designed to be used interactively. A typical session would be to get into MODEM9 and then dial up the system you want to talk to. When you get the carrier and have set the modem from talk to data, then enter the terminal mode. We will assume that you have logged into an RCPM with the XMODEM program on it. Perusing through the directory of the RCPM, you see a file that you would like. To download the program to your system you must do the following four steps.

- 1) Invoke the host's transfer program, calling out the send mode and the desired filename. That might be something like:

"XMODEM -S FILENAME"

- 2) Exit the terminal mode back to the command mode. Then enter the D command.
- 3) Enter the filename to store the data in.
- 4) Return to the terminal mode when the transfer is over.

Uploading a file is done in a similar fashion. I should point out that most of the bulletin boards give you the info on how to use their XMODEM or its equivalent as part of the login procedure.

This may seem like a lot to do quickly, but don't forget, you've got about a minute to get steps 1 to 3 done.

MODEM9 has a number of error modes that it checks for. Besides checksums, there are timeouts, missing packets and a few others. If a transfer does get clobbered to the point where XMODEM9 aborts then the only thing you can do is to get back to the terminal mode and fire back a few control-x characters. Control-x is the cancel code. Technically, it's not part of the Christianson spec. However, I've read where many of the RCPM's put it in. I have only had this happen to me once.

All though I have not tried it, you should be able to use this program to exchange software with other 6809 users. To do this will require some cooperation though. After phoning the desired party, both would enter the terminal mode. This would allow them to "talk" to each other through their terminals. (Note that each user must hit both <cr> and <lf> at the end of a line) To transfer a file, one enters the download mode while the other enters the upload mode. You can even exchange binary files this way. I think that you will enjoy using this program. I do.

## CAVEATS

There are a couple of remaining rough spots and caveats to be aware of. Sometimes when I log off my work system and the host modem drops carrier the modem port will hang and hitting NULL won't take the program out of the terminal mode. I haven't investigated it.

There are three file modes; Ascii, Binary and CP/M. What these modes do is change how the FLEX file gets opened. Here is a short synopsis. Remember that when you're sending a file it's opened for read at your end.

## Ascii

Read: Open file in the text mode. Send all characters as they are.  
Write: Open file in the text mode. Tabs are expanded to spaces before being written to the file. All other control codes except <cr> are filtered out.

## Binary

Read: Open file in the binary mode and send all characters as they are.  
Write: Open file in the binary mode and send all characters as they are.

## CP/M

Read: Open file in the text mode. Add a <lf> after each <cr>.  
Write: Open file in the binary mode and send all characters as they are.

Sending a file to a CP/M system in the CP/M mode has been done in both directions on my 8088 system. Since CP/M terminates all lines with <cr><lf> and allows tabs (which it assumes are 8 spaces) it's easier to just receive them in the binary mode and then post-process them. The programs ELIST and BCOPY do just that. They open read files as binary and then expand tabs and swallow any control characters other than <cr>.

## USING THE CAPTURE BUFFER

You might be wondering what the capture buffer is used for. Well, it just buffers whatever comes in on the modem when you are in the terminal mode. It is also a nice way to getting files from systems that don't have an XMODEM or equivalent, which was its original purpose. The 8K buffer in this version is a little on the small side. After using it a while I feel that 16K or 24K might be more comfortable, I will expand it during the next compile.

The erase, list and print commands were added as

ods to snooping. Unless the host is in your local phone area you will be using long distance. The buffer is handy for things like capturing the host's directory. Then you can get into the command mode and look at it (after the initial capture) at 9600 baud instead of 300! Even if you don't mind the cost, it's still a lot easier on the nerves. For a permanent copy, use the print command.

IT'S A WRAP

That's it for this column. I would like to give the column a new direction. As I said earlier. Time is very premium here and will be for the next year at least. I can not fit in regular columns and get any programming done. I prefer programs to writing columns and will assume that you do also. All this boils down to the fact that unless there is new software to review or other major news, I will try to bring out programs. This will keep the column active, but certainly not a monthly occurrence since most decent programs are a major undertaking.

I would welcome any programs from readers for publication. Just because you may feel that it's not earth shaking doesn't mean that it shouldn't be published. Other people will be interested in it. I have learned an awful lot from reading other people's code. Even the "simple" programs. If you don't feel comfortable sending them to me, then send them directly to the magazine. Let's get some more programs! Till then...

```

/* 
** Command key definitions
*/
#define BAUD      'b'
#define CAPTURE   'c'
#define DOWNLOAD  'd'
#define ERASE     'e'
#define FILESET   'f'
#define HELP      'h'
#define KEEP      'k'
#define LIST      'l'
#define PRINT     'p'
#define SQUIT     'q'
#define SETTINGS 's'
#define TERMINAL 't'
#define UPLOAD   'u'
#define VIEW     'v'
#define LOCAL    'z'

#define 0x00  /* 0x00 (shift-control-2) 0/ */

/*
** Ascii defines
*/
#define PARMASK  0x7F
#define DEL      0x7F
#define BYTMASK  0xFF
#define BS       0x08
#define TAB      0x09
#define LF       0x0A
#define CR       0x0D
#define CTLZ    0x1A /* end of text-file character */

/*
** hardware defines
*/
/* acia stuff */
#define MODEM    0xE000
#define TEPRA    0xE004
#define DATA     1
#define CONTROL  0
#define STATUS   0
#define RDRF    0x01 /* rcv ready status bit 0 */
#define TDRF    0x02 /* zeit ready status bit 0 */
#define REBET   0x03 /* reset bit pattern 0 */
#define READY   1
#define NOTREADY 0
#define D300    0x16
#define D1200   0x15
#define SPS     0x00 /* should be tweaked 'per system' 0 */

/* pia stuff */
#define PRINTER  0xE00A
#define PDATA    1
#define POIR     0
#define PSTAT   1
#define PCONT   1
#define PW_BITS  0xFF /* write bits 0 */
#define PSETUP   0x2E /* control setup bit pattern 0 */
#define PRODY_BIT 0x80 /* ready bit 0 */

/*
** Misc. defines
*/
#define DOTS     50 /* sector counting dots per line 0/
#define ERROR    -1
#define TAB8ZI  0
#define CPM      0 /* editorial comment?? 0/
#define ASCII   1
#define BINARY  2
#define RA      'r'
#define RD      'r'
#define MA      'u'
#define MG      'm'

/*
** global variables
*/
FILE *fd;
char file_node, /* file access node flag 0/

```

```
*****  
00  
00  Program:  nodeaf  
00  Module:  nodeaf.h  
00  Authors:  M. F. Comes  
00  Last edits:  2/19/86  
00  
00  Header file for nodeaf, an tMODEM compatible program  
00  using the Ward Christianson file transfer protocol.  
00  This particular implementation draws very heavily on  
00  programs or ideas either previously published or sent  
00  to the author by:  
00  
00          Joe Bellomo  
00          David D. Clark  
00          Pete Sichul  
00          Sid Thompson  
00  
00  Their contributions are gratefully acknowledged.  This  
00  program is placed into the public domain and may be  
00  copied and modified without permission from the author  
00  providing proper acknowledgement is made.  
00  
*****
```

Include "STDIO.H"

```

/*+
 * Special characters for the file transfer protocol
 */

#define TIMEOUT -1
#define SDH 1 /*+ start of sector */
#define EOT 4 /*+ end of transmission */
#define ACK 6 /*+ successful transfer */
#define CAN 24 /*+ cancel transmission */
#define MAX 23 /*+ error detected */
#define SECSIZ 128 /*+ bytes per sector */
#define BUFSIZ 8192 /*+ the capture buffer */
#define EARDRATA 10 /*+ number of errors till abort */
#define RETRYMAX 5 /*+ number of retries till abort */

```

```

eofflag;           /* end of file flag */
lf_flag;           /* LF flag for CP/M mode */
viewmode;          /* viewing mode */
cflag;             /* capture flag */
pflag;             /* print flag */
kbdata;            /* data from keyboard */
oddata;            /* data from QDOS */
asciflag;          /* ASCII flag */
showtrans;         /* show transmitted data switch */
showrecv;          /* show received data switch */
view;              /* view switch */
fr_str;             /* read file open mode string */
fw_str;             /* write file open mode string */
bufr(BUFSIZ),      /* the capture buffer */
filenam[5],        /* file name buffer */
answerr[10];       /* general buffer for user input */

////////////////////////////////////////////////////////////////
***** Program Information *****

# Program:   code9
# Modules:  code9.c
# Authors:   R. F. Caso
# Last edit: 2/6/84
# 

# This is the main module.  It contains the top level
# command handler, terminal emulator, and system set up
# functions.
# 

////////////////////////////////////////////////////////////////

#include "MODEN.H"

#define REVNO "1.3"           /* rev number for entry banner */
#define CLIBCRN "1033E"        /* M19 initialization string */

static tableft,      /* how many columns are left until a tab stop */
tabsize,            /* the tab column modulo */
cur_baud;           /* the current baud rate */

main()
{
    /* Initialize program and hardware */
    /* */

    filemode = MODE1;
    r_str = RA1;
    w_str = WA1;

    viewmode = 'a';
    asciflag = showrecv = showtrans = FALSE;
    cflag = view = FALSE;
    txptr = lptr = 0;
    tabsize = tableft = TABSIZE;
    initport(MODE1,01200);
    init_dio(PRINTER,PW_BITS,PRETYP);
    cur_baud = 1200;
    printf("INFO: REVNO(%d) (%s) CLIBCRN(%s)\n",REVNO,CLIBCRN,REVNO);
    list_settings();
    printf("\n\nHit 'h' for help\n\n");

    /* the top most command processor */
    /* */

    for(;;)
    {
        printf("\n> ");
        kbdata = getchar();
        putchar('a');
        switch(toupper(kbdata))
        {
            case 'MUDI':
                set_baud();
                break;
            case 'CAPTURE':
                set_capture();
                break;
            case 'SETTINGS':
                list_settings();
                break;
            case 'HELP':
                instruct();
                break;
            case 'KEEP':
                keep_text();
                break;
            case 'QUIT':
                hangup();
                exit();
            case 'DOWNLOAD':
                readfile();
                break;
            case 'UPLOAD':
                sendfile();
                break;
            case 'TERMINAL':
                terminal();
                break;
            case 'VIEW':
                set_view();
                break;
            case 'ERASE':
                erase_buf();
                break;
            case 'PRINT':
                print_buf();
                break;
            case 'LIST':
                list_buf();
                break;
            case 'FILESET':
                set_file();
                break;
            default:
                printf("\nUnknown command\n");
                break;
        }
    }
}

/* print out all the commands to the
 * console
 */
instruct()
{
    printf("Commands:\n");
    shouchar(MUDI);
    printf("t- set the modem's baud rate\n");
    shouchar(CAPTURE);
    printf("t- toggle text capture\n");
    shouchar(DELETE);
    printf("t- download a file from the host system\n");
    shouchar(ERASE);
    printf("t- erase the capture buffer\n");
    shouchar(FILESET);
    printf("t- set file mode to ASCII, Binary or CP/M\n");
    shouchar(HELP);
    printf("t- list the commands\n");
    shouchar(KEEP);
    printf("t- file the capture buffer\n");
    shouchar(LIST);
}

```

```

printf("\t- list the capture buffer\n");
showchar(PRINT);
printf("\t- print, then erase the capture buffer\n");
showchar(BUFT);
printf("\t- return to FLEXI\n");
showchar(BETT(NBS));
printf("\t- list the current program parameters\n");
showchar(TERMAL);
printf("\t- enter the terminal mode\n");
showchar(UPLOAD);
printf("\t- upload a file to the host system\n");
showchar(VIEW);
printf("\t- toggle data viewing, initially inactive\n");
showchar(LOCAL);
printf("\t- enter the local mode (from the terminal mode)\n");
}

/*
* Terminal emulator, transparent to all
* key codes except NULL, which causes it
* to return to the command code.
*/
terminal()
{
printf("Entering terminal mode\n");
while (ctready())
{
    /* handle any console input data */
    if (instat(TERM))
    {
        if (kbdata = inchar(TERM) & PARMSC) == LOCAL)
        {
            printf("\nEntering local mode\n");
            return;
        }
        outchar(kbdata, RODEN);
    }

    /* handle any modem input data */
    if (instat(MODEM))
    {
        modata = inchar(MODEM) & PARMSC;
        capture(modata);
        outchar(modata, TERM);
    }
}

/*
* Change the capture state
*/
set_capture()
{
    if (cflag == 'cflag')
    {
        printf("Capture initiated");
    }
    else
        printf("Capture terminated");
    printf("\n, 16 bytes freed",BUFSIZ - tptr);
}

/*
* keep any captured text
*/
keep_text()
{
    int i;

    if (tptr == 0)
    {
        printf("Nothing to save?\n");
        return;
    }

    prompt("Save to file: ");
    if (fd = fopen(filenam, "w")) == ERROR)
        printf("\nCan't open '%s'\n", filenam);
    else
        for (i = 0; i < tptr; i++)
            if (putchar(buf[i], fd) == ERROR)
                break;
        fclose(fd);
        cflag = FALSE;
        tptr = 16ptr = 0;
        tableft = tabsize;
    }
}

/*
* Erase the capture buffer
*/
eras_buf()
{
    printf("Ready to clear the capture buffer.\n");
    prompt("Are you sure (y/n)?", answer);
    if (tolower(answer[0]) != 'y')
        return;
    cflag = FALSE;
    tptr = 16ptr = 0;
}

/*
* List out the capture buffer
*/
list_buf()
{
    int i;

    for (i = 0; i < tptr; i++)
    {
        putchar(buf[i]);
        if (buf[i] == CR)
            putchar(LF);
    }
    printf("\n\n");
}

/*
* Set the baud rate
*/
set_baud()
{
    unsigned rate;

    prompt("Enter baud rate: ", answer);
    rate = atoll(answer);
    switch (rate)
    {
        case 300:
            initport(MODEM, B300);
            break;

        case 1200:
            initport(MODEM, B1200);
            break;

        default:
            printf("\nIllegal value -- baud rate not changed\n");
            return;
    }
    cur_baud = rate;
}

/*
* List the current switch
* settings to the console
*/
list_settings()
{
    printf("\nThe current settings are:\n");
    printf("\n    Baud rates: %u", cur_baud);
    printf("\n    capture mode: %s", showbool(cflag));
    printf("\n    view mode: %s", showbool(vwmode));
    printf("\n    file mode: %s", switchfile_node);
}

```

```

(
case ASCII: printf("ASCII");
break;
case BINARY: printf("Binary");
break;
case CP8: printf("CP/M");
break;
}

// save data to capture buffer in FLEX
// "ascii" mode bys
//
// - expanding tabs to spaces
// - swallow all control codes
// except <cr>
//
capture()
{
    char c;
    if (cflag && tptr < BUFSIZ)
    {
        if (lc > ' ' && lc <= PARMASK)
        {
            bufr[tptr++] = c;
            if (--tableft == 0)
                tableft = tabsiz;
        }
        else if (lc == CR)
        {
            bufr[tptr++] = c;
            tableft = tabsiz;
        }
        else if (lc == TAB)
            while (--tableft > 0)
                bufr[tptr++] = ' ';
            tableft = tabsiz;
        }
    else if (cflag)
    {
        printf("\nIn capture buffer overflowed!");
        cflag = FALSE;
    }
}

// issue the prompt and return the
// response, left justified
//
prompt(p,s)
{
    char op, os;
    printf("%s",p);
    getchar();
    // left Justify the answer
    //
    p = s;
    while (op && (op == ' ' || op == '\t'))
        op++;
    while (op)
        op++;
    os = op;
    os = ' '*(op-p);
}

// show command characters nicely
//
showchar(c)
{
    if (0 < c && c <= ' ')
        printf("ctrl-%c",c-'0');
}

// show the state of a boolean
//
showbool(b)
{
    int b;
    if (b)
        printf("on");
    else
        printf("off");
}

// print out the buffer to the parallel
// port, checking for the user input
//
print_buf()
{
    while (tptr < tptr)
    {
        parout(bufr[tptr++],PRINTER);
        if (!instat(TERR))
            continue;
        bdata = getchar();
        if (tlowerr(bdata) == 'q')
            return;
        if (tlowerr(bdata) == open(DRQ))
            while (!inout(TDRQ));
        getchar();
    }
}

// This file contains the file send/receive routines for
// the Ward Christianson protocol.
//
#include "WODEM.H"

// read a file using the INODEM protocol
//
readfile()
{
    int r_char, sectave, sectcurr, sectcomp, errors;
    int checksum, r_checksum, perrorflag, fd, i;
    char sector[SECSIZ+1], mode[20];
    // get the filename //
    prompt("Enter filename ",filename);
    // set up viewing flags //
    showrcv = showtrans = FALSE;
    if (visual)
        showrcv = TRUE;
}

```

```

/* try to open the save file */
if ((fd = fopen(filename, "w")) == ERROR)
{
    printf("Can't open %s for %s\n", filename, "w");
    return;
}

/* now, read it in */
printf("Receiving %s\n", filename);
sectnum = errors = 0;
sendchar(NAK);

do
{
    errorflag = FALSE;
    do
        r_char = readchar(fd);
        while (r_char != SOH && r_char != EOT && r_char != TIMEOUT);

    if (r_char == TIMEOUT)
    {
        errorflag = TRUE;
        printf("Timeout error\n");
    }

    if (r_char == SOH)
    {
        /* get sector number and complement of
        sectcurr = readchar(fd) & 0xFF;
        sectcomp = readchar(fd) & 0xFF;

        /* try to read the sector */
        if (sectcurr + sectcomp == 255)
        {
            if (sectcurr == (sectnum + 1) & 0xFF)
            {
                /* read the sector */
                checksum = 0;
                if (r_checksum == 'a')
                    asciiflag = TRUE;
                for (j = 0; j < SECSIZE; j++)
                {
                    sector[j] = readchar(fd);

                    checksum += sector[j];
                    checksum &= 0xFF;
                }
                asciiflag = FALSE;
            }

            /* test the checksum */
            r_checksum = readchar(fd) & 0xFF;
            if (r_checksum == r_checksum)
            {
                errors = 0;
                sectnum++;
                if (fwrite(sector, SECSIZE, 1, fd) == ERROR)
                {
                    printf("Save file write error\n");
                    fclose(fd);
                    return;
                }
            }
            /* now hang in there for a smidgen
            * timeout
            */
            idle();
            if (!showrecv)
                printdot(sectnum);
            sendchar(ACK);
        }
        else
        {
            printf("Checksum error\n");
            errorflag = TRUE;
        }
    }
    else if (sectcurr == (sectnum & 0xFF))
    {
        printf("Received duplicate sector %d\n", sectnum);
        /* wait for idle line */
        idle();
    }
    else
    {
        sendchar(ACK);
    }
    if (errorflag)
    {
        printf("Synchronization error\n");
        errorflag = TRUE;
    }
    else
    {
        printf("Sector number error\n");
        errorflag = TRUE;
    }
}
/* check for errors */
if (errorflag)
{
    errors++;
    printf("Error %d\n", errors);
    while (readchar(fd) != TIMEOUT);
    sendchar(NAK);
}

while (r_char != EOT && errors < ERRORMAX)
{
    if (r_char == EOT && errors < ERRORMAX)
    {
        sendchar(ACK);
        fclose(fd);
        printf("\nTransfer completed\n");
    }
    else
        printf("Aborting\n");
}

/* send a file using the MODEM protocol
 */
sendfile();
{
    int sectnum, attempts, status, checksum, fd, j;
    char sector[SECSIZE], mode[20], r_char;

    /* get the filename and file mode */
    prompt("Enter filename: ", filename);

    /* do some housekeeping */
    showrecv = showtrans = FALSE;
    if (view)
        showtrans = TRUE;

    if ((fd = fopen(filename, "r")) == ERROR)
    {
        printf("Can't open %s\n", filename);
        return;
    }
    errorflag = fd_flag = FALSE;

    printf("Sending %s\n", filename);
    sectnum = 1;

    /* wait for initial NAK or
    attempts = 0;
    while (readchar(fd) != NAK && attempts < RETRYMAX)
        attempts++;
    if (attempts >= RETRYMAX)
    {
        printf("Timed out waiting for initial NAK\n");
        fclose(fd);
        return;
    }

    /* send the file */
    attempts = 0;
    while (attempts < RETRYMAX)

```

```

{
  status = fread(fd,sector,SECSIZ);
}

/* exit on EOF or ERROR, so can't tell which */
if (status == EOF)
  break;

/* try sending the sector a few times */
attempts = 0;
do
{
  {
    if (!showtrans)
      printdot(sectnum);
    sendchar(SOH);
    sendchar(sector[0] & 0xFF);
    sendchar(sector[1] & 0xFF);
    checksum = 0;
    if (viewmode == 'a')
      sector[2] = 0x00;
    if (sector[2] & 0x80)
      sector[2] = 0;
  }

  /* send the sector */
  for (i = 0; i < SEC8[2]; i++)
  {
    sendchar(sector[i]);
    checksum += sector[i];
    checksum &= 0xFF;
  }

  asciiflag = FALSE;
  sendchar(checksum);
  attempts++;

  /* get receivers response to the block */
  purgeline(MODEM);
  r_char = readchar(SI & PARMSK);
  if (r_char == NAK)
    printf("%s NAK\n",r_char);
  else if (r_char == TIMEOUT)
    printf("%s T0\n",r_char);
  else if (r_char == ACK)
    printf("%s ACK\n",r_char);
  }

  if (r_char == ACK && attempts < RETRYMAX)
  if (attempts < RETRYMAX)
    sectnum++;
}

/* check for errors now */
if (attempts > RETRYMAX)
  printf("\nNo acknowledgement of sector -- Aborting\n");
else
{
  attempts = 0;
  do
  {
    sendchar(EDT);
    purgeline(MODEM);
    attempts++;
  }
  while (readchar(SI) == ACK && attempts < RETRYMAX);
  if (attempts > RETRYMAX)
    printf("\nNo acknowledgement of end of file -- Aborting\n");
  else
    printf("\nTransfer complete\n");
}

fclose(fd);
}

/* timed read of the modem port */
if
readchar(seconds)
  unsigned seconds;
  {
  char data;
  seconds = seconds * 8PS;
}

/* wait for data */
while (!instat(MODEM) && seconds)
  seconds--;
}

/* test for timeout */
if (seconds == 0)
  return TIMEOUT;

/* get data and show it if necessary */
data = (uchar(MODEM));
if (showrecv)
  showdata(data);
return data;
}

/* send a char */
if
sendchar(data)
  char data;
  {

  /* wait until output is ready */
  while (!outstat(MODEM));

  /* send the data */
  outchar(data,MODEM);
  if (!showtrans)
    showdata(data);
}

/* show a character */
if
showdata(data)
  char data;
  {

  if (asciiflag)
    if ((data > ' ' && data <= PARMSK) ||
        data == LF || data == CR || data == TAB)
      putchar(data);
    else
      printf("%02x",data);
  else
    printf("%02x",data);
}

/* print a dot on the screen */
if
printdotnum
  int num;
  {
  if ((num - 1) % 80 == 8)
    printf("\n%4d.",num);
  else
    putchar('.');
}

/* set up the view state
 * 1 MODEM transfers
 */
set_view()
  {
  char answer(20);

  if (view == 'view')
    {
    prompt("View as Ascii or Hex: ",answer);
    printf("Viewing will be in %s",view);
    if (tolower(answer[0]) == 'h')
      {
      viewmode = 'h';
      printf("Hex\n");
      }
    else
    }
}

```

```

    {
        v16nodecode = 'a';
        printf("Ascii\n");
    }
}

else
    printf("Viewing Disabled\n");
}

/*
 * wait for an idle line
 */
idleint
int np
{
    while (readchar() != TIMEOUT);
}

/*
 * set up the file characteristics
 * for readon transfers
 */
set_file()
{
    prompt("Enter file mode (Ascii/Binary/Cp0)", answer);
    switch(toupper(answer[0]))
    {
        case 'B': file_mode = BINARY;
                    r_str = RB;
                    w_str = WB;
                    break;

        case 'C': file_mode = CP0;
                    r_str = RA;
                    w_str = WA;
                    break;

        default:  file_mode = ASCII;
                    r_str = RA;
                    w_str = WA;
                    break;
    }
}

/*
 * This file contains the nodes hardware drivers, and the
 * real disk I/O routines.
 */
#include "NODEM.H"

/*
 * acia drivers
 */
initport(port, setval)
{
    char port();
    int setval();
    {
        port(CONTROL) = RESET;
        port(CONTROL) = setval;
        purgeport();
    }
}

/*
 * initialize the ACIA hardware
 */
initport(port, setval)
{
    char port();
    int setval();
    {
        port(CONTROL) = RESET;
        port(CONTROL) = setval;
        purgeport();
    }
}

/*
 * test for an input character
 */
inchar(port)
{
    char port();
    {
        while (!instat(port));
        return port(DATA);
    }
}

/*
 * get an input character
 */
inchar(port)
{
    char port();
    {
        while (!instat(port));
        return port(DATA);
    }
}

/*
 * test for output ready
 */
outstat(port)
{
    char port();
    {
        return (port STATUS & TDRE);
    }
}

/*
 * send a character
 */
outchar(c, port)
{
    char c, port();
    {
        while (!outstat(port));
        port(DATA) = c;
        return c;
    }
}

/*
 * purge the input line of data
 */
purgeport()
{
    char port();
    {
        while (!instat(port));
        inchar(port);
    }
}

/*
 * initialize the pia
 */
init_pia(port, mbits, setval)
{
    char port();
    int mbits, setval();
    {
        port(PCMOUT) = 0;
        port(PBIR) = mbits;
        port(PDMT) = setval;
        port(PDATA) = '\0';
    }
}

/*
 * send a char to the port,
 * expanding (cr) into (crlf)
 */
parout(c, port)
{
    char c, port();
    {
        if (c == CR)

```

```

        poutd(LF, port);
        poutd(c, port);
        return c;
    }

/*
 * actually send the character
 */
poutd(c, port)
    char c, port();
{
    char junk;

    while (parstat(port) == NOTREADY);
    junk = port[PDATA];
    port[PDATA] = c;
}

/*
 * check the port for ready
 */
parstat(port)
    char port();
{
    return (port[PSTAT] & PRDY_BELL);
}

////////////////////////////////////////////////////////////////
/*
 * More are the disk routines that do a
 * reasonable job of scrounging for
 * level disk I/O
 */
////////////////////////////////////////////////////////////////

/*
 * Try to read a buffer from the disk;
 * if less, then NULL pad the rest of
 * the sector
 */
/*
 * Special dispensations for CP/M (ugly)
 * 1) expand newline into a <cr><lf>
 * 2) pad partial sector with '^'
 * 3) tag a sector of '^'s on the end
 * just in case
 */
freadlf(b, n)
    FILE ofp;
    char ob;
    int of;
    int bytcnt;
    int c;           /* must be an int to preserve EOF n */
{
    if (EOFflag)
    {
        if (file_node == CPM_B6 || flag == 2)
        {
            bytcnt = 0;
            goto pad_sector;
        }
        return EOF;
    }

/*
 * special case for the CPM node when '\n'
 * was the last character of the last sector,
 * so we have to pick up in this sector
 */
    bytcnt = 0;
}

if (file_node == CPM_B6 || flag)
{
    ob = LF;
    bytcnt++;
    LF_flag = FALSE;
}

/*
 * read in a sector, one byte
 * at a time
 */
for (i = bytcnt; i < bytcnt+n;
     i++)
{
    if (c = getc(f1) == EOF)
    {
        if (LF_flag == TRUE)
            break;
    }
    else
    {
        switch(file_node)
        {
            case BINARY:
                ob++ = (char)c;
                break;
            case ASCII:
                if (c == '\n')
                    ob++ = CR;
                else
                    ob++ = (char)c;
                break;
            case CPM:
                if (c == '\n')
                {
                    ob++ = CR;
                    if (bytcnt < n - 1) /* room for <cr><lf> ? */
                    {
                        ob++ = LF;      /* yes */
                        bytcnt++;
                    }
                    else
                        LF_flag = TRUE; /* save for next time */
                }
                else
                    ob++ = (char)c;
                break;
        }
        /* pad if not full */
        pad_sector:
        switch(file_node)
        {
            case CPM:
                while (bytcnt < n)
                    ob++ = CR;
                break;
            default:
                while (bytcnt < n)
                    ob++ = NULL;
                break;
        }
        return bytcnt;
    }
}

/*
 * write out a sector
 */
fwritelf(b, n)
    FILE ofp;
    char ob;
    int of;
    int bytcnt;

for (bytcnt = 0; bytcnt < n; bytcnt++)
{
    if (putc(ob, of) == ERROR)
        return ERROR;
}
return bytcnt;
}

```

# WHERE IS ? THE 68000 ?

Where Is the 68000? That is a question we have heard often from the '68' Micro Journal Readers. Most of our readers expected to see the 68000 appear in SS-50 Bus machines before any place else for several reasons: the close ties to the Motorola CPU Family; the fact that all that was needed, initially, was a simple Operating System and a CPU Card (all of the I/O links, etc., were already fairly compatible), along with a simple adaptation of Motorola's Assembler, to allow serious development work to begin; the fact that, while the 68000 architecture IS different from the 6800/6809, it is closer in both Hardware and Software to them than is any of the '80 Series CPU's; etc. The Software Writers, especially, who have doggedly supported the SS-50 Bus, and who have longed for a viable Marketplace for their Products, felt a rise of joy with the 68000's announcement; maybe, AT LAST, a Motorola CPU that the whole WORLD acknowledged as "THE" CPU of the future, would provide the impetus to get the SS-50 Bus Systems out into the Real World in numbers that would make supporting them worth all of their effort. While most of these Writers (AND the '68' Micro Readers) are STILL waiting for SOMETHING from the SS-50 Bus Manufacturers, those that are REALLY interested in the 68000 have begun to investigate other avenues.

Yes, there are a few SS-50 Bus 68K Boards that will appear in the near future. The LSI 68008 Board is about to be released (w/ CP/M 68K); Gimix expects to have a 68000 CPU Card for their Gimix II System late this Summer (w/ Microware's 68K Ver. of OS-9); and Hazelwood should have their 68008 Board available this year (probably w/ CP/M 68K); but I am afraid that they will be too late to have the Market Impact that would induce "doves" of Software Writers to write the multitude of Programs that are REQUIRED to make these Systems a viable force in the Market Place of Today (AND generate enough Software Sales that a Writer can make a LIVING by supporting that System).

The overall feeling among the SS-50 Bus Software Producers is one of FRUSTRATION; many are barely meeting the FIXED costs of producing Software, let alone make a small profit to help support their "Hobby" (and some, such as Howard Harkness of Wards Worth and Gerry Williams of JPC, have simply given it up as not worth the effort of taking orders, shipping, answering questions, keeping up with who has what version, wrestling with the financial problems such as telephone bills, printing costs, credit card discounts, etc.). Is it worth even a hobbyist's time to spend three years developing a program that probably won't sell a thousand copies over the life of the System it is to run on. If a piece of Software for an Apple II, or a Commodore, or Atari, or IBM PC, etc., doesn't sell a thousand a month, it is dropped from the Market Place as a total loss. WE know that the quality of the SS-50 Bus Machines are magnitudes better than the "competition", and that the Operating Systems are "un-touchable", but WHERE are they in the Market Place of Today?

Everyone has been waiting for a 68000 Operating System to emerge as a "front runner". While the field is still open, Digital Research is making headway with their CP/M 68K, and numerous "Unix Look-alikes" are appearing, as is Unix V and VII with full AT&T Support. CP/M 68K carries the CP/M "logo", which makes it appear attractive, but it is a Single-User Operating System with no more REAL Software Support than any

other DOS (obviously, none of the '80 Software will run with it until it is converted to 68000 Code). Unix, which was developed BY Programmers FOR Programmers, is becoming the "IN" Op Sys because the people who WRITE Programs like it, but it will require a new Shell (or maybe a "pre-Shell") which is magnitudes more User Friendly before it will become a real force in the "Numbers Game", or find common User Acceptance. And BOTH are written in C.

While C is a MAJOR improvement over most Compiled Languages, and should find a home in many Application Software situations, it is still not the answer in a "Real-Time" Interactive User Environment such as a Word Processor or an Operating System on a Computer "For the Masses" until we get away from BOTH the "Ron Cain Small C" AND the Mainframe types of Compilers, and develop a C Compiler that is STREAMLINED for the specific CPU it is to be used on. C is not as fast as Assembly Language, and eats up a lot more Memory (which, while not as expensive as it used to be, is still a major portion of the cost of a Computer System). A simple C Program to count the number of characters, words, or lines in a file produces a Command File size of 7228 bytes (Microware's "Count" utility), while the whole OS-9 Assembler has a File Size of only 5844 bytes. As for speed, the hesitant start of the original Apple Lisa should provide a fairly good indication of its value in an Operating System. While Ron Cain's "Small C Compiler" was probably the MAJOR force in making C a viable Language in the Microcomputer Arena, it was written for an 8080, and uses an Intermediate Register Set of ONE 8-BIT Register and ONE 16-BIT Register; obviously, both the 6809 and 68000 have a little better capability than THAT (Re. "C Compiler Techniques" by Bud Pass in the Nov. '83 "System-68" - I think it was the final issue?). The "Mainframe-type" Compilers could care less about the amount of code generated; memory is the LEAST of their problems. For another indication of the power of speed and efficiency in the Micro Market-place, look at the BDS C Compiler. It was "streamlined" for a Z80 and CP/M, and while it is not even CLOSE to "K&R" (try converting a BDS C Program to run on a Unix Compiler), it Compiles fast and produces efficient code on a Z80 CP/M System, and has become a real FORCE in the CP/M C Compilers over the "standard" Compilers: again, speed and efficiency wins out.

Where ARE the 68000 "Machines"? Basically, they are just about everywhere BUT on the SS-50 Bus!

There are some interesting Non-SS-50 Bus 68000 Systems in the Market, along with a multitude of "Standard" 68000-based Computer Systems. For the Hobbyist, Sinclair Research Limited (50 Staniford St., Boston, MA 02114 617-742-4826; drop them a note, or give them a call -- tell them WE sent 'ya) has a 68008 Computer System (the Sinclair QL) for \$499, less a Display Unit. Their original ZX80 set the Computer Industry on its ear a few years ago; look at the specs on the "QL". For \$499 (as of now -- a US Version should be available this Summer), you get:

- a 7.5 MHz 68008;
- 128K Memory, expandable to 640K with the .5MB RAM pack (32K dedicated to the Screen bit map);
- TWO built-in 100KB "Microdrive" Tape Units with 3.5 second average access time and 15 bytes/sec transfer rates (expandable to 8 Drives);
- 32K ROM which contains Sinclair SuperBASIC featuring procedure structuring, syntax extensibility, Interpretation speed independent of program size, and Operating System Support; and the Sinclair QDOS Operating System which features such things as Single-User, MULTI-Tasking, Display handling for multiple Screen Windows, and Device-Independent I/O
- a second processor (Intel 8049) which controls the Keyboard, Sound, an RS-232-C Port, and real-time Clock;
- BOTH RGB Monitor and a TV Output - the RGB provides 512 x 256 pixels in 8 colors with an 85 x

25 character display format, while the TV output provides 40 to 60 columns, depending on software;  
 -- full 65 key QWERTY Keyboard with 5 function keys and 4 cursor-control keys;  
 -- two joystick ports  
 -- and **FOUR SOFTWARE Packages, Including**  
 QL QUILL - a word processor,  
 QL ABACUS - an electronic spreadsheet,  
 QL ARCHIVE - a database program, and the  
 QL EASEL - graphics package.

And that is only a **SUMMARY** of the Sinclair QL's features. We will provide more information as it becomes available (and any of you Readers that have seen one of these machines, let us know about it!).

For the "Experimenter Types", another interesting 68000-based Computer System is the "dimension", from Micro Craft Corp., 4747 Irving Blvd., Dallas, TX 75247 (214) 630-2562. The dimension is an 8 MHz 68000-based Computer System (physically similar to an IBM PC, including a detachable keyboard) that comes with the CP/M 68K Operating System, 128Kb memory, two 5 1/4" double-sided Disk Drives, an RS-232C port, a parallel port, a graphics controller, a real-time clock, and a 6-slot expansion bus for \$3995. What's different about it? First, the expansion slots have ALL of the 68000's lines, internal memory access and control lines, disk drive lines, etc., so that various emulator boards can be plugged in that have control of the complete Computer System. Boards are now available to allow the dimension to run IBM PC Software, Apple II Software, Radio Shack Model III/IV, etc. Each Board comes with the appropriate CPU and specific emulation Software, and is priced at \$495. The Overall System was designed specifically to provide these "emulation" capabilities, thus the expansion slot provisions. The dimension provides 64Kb of graphics memory which yields a bit-mapped resolution of 160x500 in 16 colors to 640x500 pixels on/off, the capability to define as many character sets as you have memory for and use any of them "on the fly", define display scroll areas through low-memory pointers, etc. The Keyboard "Key Codes" are accessible through a pointer in low-mem, allowing User Control of these, also. Special Utilities are provided which allow things like changing the Display Format from a 20x20 to a 100x25 character display, or select from numerous Disk Formats (or define your own, if you want), etc. Another unique feature of the System is that there are NO Seals to break to get INSIDE the Computer; in fact, Micro Craft ENCOURAGES it. They also give a ONE YEAR Warranty.

Finally, for "every John Doe in the World", there is the Apple Macintosh. If you don't know about the \$2500 "Mac" by now, you have had your head in the sand somewhere, so I won't go into all of the details of it here. I will say that it appears that it WILL become a real force in the Microcomputer World. For one thing, Microsoft expects HALF of their INCOME the next year to be from Macintosh Software. When you consider their income from the different BASIC's, MS DOS, their Compilers, etc., that is big expectations from a little Computer. Apple indicates that they have commitments from over 100 Software Developers and Suppliers for support of the Mac. They are also going ALL OUT to support valid Software Developers (I believe you could almost talk them out of the Source Code for the ROM if you tried). If you have not actually SEEN one yet, then you had better take a hard look; those "Windows" are FAST, SMOOTH, and Operationally EFFICIENT, and caused ME, an long time "Keyboard Pounder", to set up and take notice. How long did it take you to become comfortable with FLEX, let alone OS-9? I, personally, have had MY plate full of crow; I am now ready to take a realistic, hard look at the Macintosh/Lisa combination. I think the combination may offer some real possibilities.

Much has been said about the Mac's lack of expansion ports; that the interconnection between the Mac and Lisa is not a true Multi-User Interface.

True! But, tell me WHY a System has to share a CPU to be USABLE! What has to be shared is the DATA, not the CPU; that is why Networking is becoming so popular. I believe that the Mac/Lisa combination will provide a means for the "World" to break away from the "Old Ways" and allow shrewd Software Designers to develop new methods and techniques which may provide BETTER solutions to Application Problems, such as multiple-access Data Base use, for example. After all, the slate is CLEAN, as far as these machines are concerned. No one has a Software Base that can be simply "moved over" to the Mac or Lisa; they are not '80 type machines that are still running 8080 Code on an 8086 or 80286, using the same old non-Window "System Calls". Sure, I expect the early Mac and Lisa Software to be "re-written" Interpreted or Compiled ports from what is now the "IN" Programs; but Apple will sell enough of these Computers to make the effort required to design "New" Products worth the effort, and the speed and efficiency of a well-designed Assembly Language Program will make the effort worth the writers time. If Mac does nothing more than help break some of the "Computer Science World" out of the 8080 rut, it will have accomplished more than any other product has ever accomplished.

We at Computer Publishing Inc., along with our Readership, consider the 68000 to be part of OUR stable. We, like others, thought that it might be the "salvation" of the SS-50 Bus, and cheered its appearance. While we are in NO way abandoning the SS-50 Bus or the 6800 and 6809, we ARE looking for 68000 information, no matter WHAT Bus or Operating System it is on. As any regular reader of the '88 Micro Journal is well aware, WE here in the Office do not WRITE the Magazine; we simply pass on what we receive from the Readership. I can assure you that we have published just about EVERYTHING we have received that had ANY reference to the 68000.

It may appear that we are heading in another direction with this statement, but that is not our intent. Computer Publishing Inc. has supported the "Motorola Microprocessors", which, until the Color Computer came along, meant that we primarily supported the SS-50 Bus Systems. The 6809 is an excellent Microprocessor that, in many situations, is the BETTER processor for an application, and it will be interesting to see where it finally "settles in" in the Microcomputer Industry.

But the 68000 is appearing in the Applications Market on a variety of Bus Structures and with a variety of Operating Systems. We hope that YOU will use the '88 Micro Journal as a "forum" for discussing the pros and cons of ANY 68000-based Computer System, Operating System, Program, etc., with the overall objective of spreading the information around. Obviously, no ONE User can be in a position to compare ALL of the Systems that are available, so pass on what YOU have so that others can learn from it. This is far and away the most efficient way to help the 68000 progress into the types of Systems that we all hope will develop over time years.

We have a unique opportunity to help "guide" the 68000's future. YOUR comments will provide guidelines for the Hardware and Software Producers; some "brave souls" have taken a first shot, now they NEED to KNOW what you like and dislike about these Systems. What are the GOOD and BAD points of an Operating System. What do you LIKE about THIS particular Product, and what would you like to see changed. Most Readers are familiar with FLEX and OS-9; how does Op Systems like CP/M 68K, PICK, Unix, Xenix, QBasic, etc., etc., compare to them (since they provide a common reference). What are the good and bad points, expansion capabilities, prices, etc., of Systems such as SAGE, CODEX, Mac and Lisa, Multibus, Versabus, etc. YOUR comments provide information for both the Manufacturers AND the Users. If you have seen a new 68000 Product, let us know about it.

Finally, the 68000 provides a new and flexible

architecture. How can it best be used? What is similar, and what is different, between it and the 6809 as far as Programming Techniques, Register Manipulations, Parameter Passing, Interrupt Processing, Stack Manipulations, etc., is concerned? What are the most efficient algorithms for the 68000, whether it be Task Swapping, Graphics Display manipulations, List Indexing, or what ever?

Where is the 68000? It's out there; in everything from the Sinclair QL, through the IBM 9000, and beyond. It's finding heavy use in the CAD/CAM industry. Just because it is not on the SS-50 Bus doesn't mean the Readers are not interested in it. Sure, owners of present SS-50 Bus Systems are anxiously awaiting those 68000 CPU Cards, because a CPU Board is a lot less expensive than a whole new Computer System. But, that does not mean that it is the ONLY System they are interested in. Let us hear from you if you have ANY 68000-based System!

— RLW —

## A REVIEW

### PROGRAMMING IN C

by Leroy Foster

I am a touch typist. Every once in a while I carelessly let my hand "shift left one bit" from the home keys. The output from the next few keystrokes is gibberish with stars, exclamation points, and other assorted garbage. Unfortunately, this was also my first impression of the C language. I purchased Kernighan and Ritchie's "The C Programming Language" and found it too esoteric. I remained C illiterate, vowing that someday --.

That day is here. Stephen G. Kochan has lifted me into the ranks of C programmers with his book "Programming in C" (Hayden, 1983). Chapters 1 and 2 are introductory chapters. C starts in chapter 3. I was elated to find that I could read his sample C programs and that I could actually write a C program when he asked me to at the end of the chapter. I was on my way, devouring each chapter, learning step-by-step the ins and outs of this elegant and powerful language. Each chapter has clear examples and explanations that move from the simple to the complex. Exercises are provided at the end of each chapter to "burn in" the material. Mr. Kochan has provided 17 chapters and 6 appendices to guide the reader through C. Chapter titles include Program Looping, Making Decisions, Arrays, Functions, Structures, Character Strings, Pointers, Operations on Bits, and Input and Output. In addition, Mr. Kochan has tactfully included pertinent references and ties to the UNIX™ operating system.

I feel that "Programming in C" can be used by two groups of readers. If a reader has some programming experience, that reader can move at his/her own speed in a self-study mode. New programmers, the green, un-bent kind, would probably be best served in a structured

classroom setting where the book should serve as an excellent text.

Mr. Kochan recommends that the reader have access to hardware that can run both the sample programs and the exercise answers. I concur. It is the only effective way. Otherwise it is like learning to swim without water. But don't let that stop you from getting a copy of "Programming in C" if you are interested in C. Stephen Kochan has provided the incentive in his book to get you out of the armchair and up and running C.

## THE GIMIX III SYSTEM

by Robert L. Nay

### Introduction

The Computer Systems produced by GIMIX, Inc. have withstood the 'Test of Time' in the hands of users from the Personal Computer level up through the Professionals such as NASA, DuPont, Atomic Energy Commission, Ford, GM, Georgia Tech, etc., etc., etc. Standard features such as a heavy-duty Power Supply which utilizes a ferro resonant transformer, all Gold Plated Connectors, and high quality PC Boards, in combination with "State of the Art" Engineering and the constant development of new features to maximize the utilization of available Operating Systems have kept them in the fore-front of the SS-50 Bus Systems. The "motto" at GIMIX, Inc. appears to be "Uncompromising QUALITY".

The latest offering from GIMIX consists of their "GMX III" Series. Basically, the "GMX III" System consists of the GMX 6809 CPU III CPU Card, the #68 DMA Disk Controller, the #11 Intelligent Serial I/O Processor Board, and, probably the MOST important part, the GIMIX 64KB and/or 256KB Static RAM Cards, along with a choice of FLEX or, more likely, OS-9 GMXIII (a 'fine tuned' OS-9 Level II) or UNIFLEX GMXIII (also specially 'tuned' for this powerful System). In addition, GIMIX offers either a 19MB or a 47MB Winchester subsystem, various combinations of 5" and 8" Disk Systems, and an Intelligent Parallel I/O Processor Board. Upgrading a present System consists of installing the appropriate Boards in the standard "Ghost Classy-Chassis", or complete Systems can be purchased beginning at less than \$6000 plus a Terminal.

The System we have been using here in the Office was upgraded from a GMX II System a few months ago, and consists of the

GMX CPU III;  
the DMA Disk Controller driving a pair of 8" Double Sided Disk Drives, a 40 Track Double Sided and an 80 Track Double Sided 5 1/4" Drives;  
the 19MB Hard Disk System (the two 5" Disk Drives are Thin-Lines, so they set side-by-side with the Winchester in the standard Dual 5 1/4" Mounting Hole in the Chassis);  
4 GIMIX 64KB Static RAM Cards and one GIMIX 256KB Static RAM Card;  
two Intelligent Serial I/O Processor Cards;  
an old "standard" dual-port Parallel Card;  
a Missing-Cycle-Detector Module (not used with the GMX III OS-9); and  
a Baud Rate Card.  
We have the OS-9 GMX III Operating System with the new Support ROM on the CPU Card,  
and have two Terminals on-line at the present time (normally running Stylo simultaneously).  
First, some general comments on the System.

Overall, the System performance and operation is excellent. After spending some twenty years in servicing complex electronic equipment, I am amazed at the lack of problems encountered with this System. The "secret" to the success of the GMX III System is the Static RAM Boards that they STRONGLY suggest you use; in fact, we have not found ANY Static RAM Boards that would work with this System EXCEPT the GIMIX Static RAM Cards, and we have tried many of them. We have heard a few rumblings from the field in reference to "System glitches", "Operating System burps", etc., with this System; invariably, these Users were NOT using the GIMIX RAM (some other Boards appeared to work, but a glitch here, or one there, disappeared when those Boards were removed). If you are going to buy a race horse, don't hitch it to a wagon and expect to be happy with the results!

In the area of Software, we have had no unusual problems with Version 1.2 of the GMX III OS-9 (Level II) Operating System, and few problems with application Software. We are working with Great Plains in getting rid of a few "knit picking" problems with Stylo (which is intimately tied into the Hardware and Operating System, both of which contain many new features, and, therefore, present new problems to be solved); I have not had time to "live" with Sceditor III on the System yet, but it is functional; just about anything else we have tried appears to run OK.

#### The GMX 6809 CPU III

To quote the GIMIX Manual, "The GMX 6809 CPU III is an advanced microprocessor board, specifically designed for use with multi-user/multi-tasking operating systems". While the 6809 is an exceptionally powerful 8-bit microprocessor, it lacks some of the important features needed in a multi-user/multi-tasking environment. GIMIX has added numerous hardware features in this CPU Card to improve system security, overall system performance, etc. The System can access 1MB of Memory in 2K segments, and each segment can be assigned certain "attributes" (such as preventing one User access to another User's space, Write Protecting specific segments, etc.). These attributes are controlled by hardware external to the CPU itself, so a "run-away" Program, for example, will not "crash" ANOTHER User's Program.

The GMX 6809 CPU III provides some of the 68000's built-in capabilities of separating the system's operation into a Supervisor State and a User State. Any "trap" (IRQ, FIRQ, the SWI's, or one of the three "built-in" traps - UAM (UnAllocated Memory), WPT (Write Protect), or WDC (WatchDog Counter)) immediately forces the System into the Supervisor Mode, which allows the System to take appropriate action. This provides several benefits; one User's "crash" will normally have no effect on other Users, all of the trap vectors are in the Supervisor Area (normally Task No. D) so that each user has a FULL 64K of Memory with no "system" overhead, etc.

The System utilizes DMA Transfers extensively. All I/O to and from the "Smart I/O Boards" and the Disk Controller is DMA'd, as well as Memory to Memory transfers, which are handled with the On-Board Direct Memory Access Controller (DMAC). The DMAC is capable of moving data between memory locations at 1 byte every 2 machine cycles (1 byte/microsecond at 2MHz), which greatly improves System operation (and is one of the reasons the GIMIX Static RAM Boards are REQUIRED). During DMAC transfers, the CPU is put in the "Halt" mode (i.e., the DMAC uses the "halt/burst" transfer system).

Obviously, with both On-Board and External DMA Systems operational in the GMX III System, some kind of a DMA Contention scheme is required. An On-Board Hardware DMA Arbitration system extends priority to an External "cycle/steal" DMA System such as the #68 DMA Disk Controller, but allows the DMAC system priority over any other "halt/burst" DMA System. "Smart I/O Board" transfers are accomplished by the

#### DMAC System.

Specific features of the GMX 6809 CPU III Board include:

2 MHz 6809E CPU.

Expanded memory management (DAT) which supports up to 1 M Byte of memory in 2K segments.

Allows a full 64K of RAM in a User's Address Space with NO System overhead.

Memory segment attributes that provide:

Trapping of out-of-range memory references,  
Write Protection of individual segments,  
Protection against certain illegal instructions,  
and Hardware Single-Step capability.

High-Speed Memory-to-Memory and Memory-to-I/O DMA transfers at 1 byte per microsecond.

Arbitrates contention between the on-board DMAC and external DMA devices.

Separate Supervisor and User "states" to prevent unauthorized access to system information and devices.

Automatic switching to the Supervisor State in response to hardware and software interrupts.

Full function Time-Of-Day clock with year, automatic leap year/daylight savings time correction, and on-board battery.

6840 Programmable Timer with a separate 500 KHz precision (.0025%) time base oscillator.

Accepts one 2K, 4K, or 8K EPROM for on-board firmware, up to 4K mapped into the address space at one time.

Software or Hardware selection of the upper or lower half of an 8K EPROM for software switching applications.

2K CMOS scratchpad RAM with battery backup.

Numerous Jumper Selection Options are provided on the GMX 6809 CPU III Board which provide flexibility in the use of the Board for different Operating Systems, as well as providing the User with some capabilities in selecting other functions.

#### DMA Disk Controller #68

The DMA Controller leaves the processor free to perform other tasks once a transfer has been initiated, allowing the overall System to realize the full potential of today's modern Operating Systems. The DMA Disk Controller provides the features:

HIGH SPEED using bi-polar logic DMA circuitry for guaranteed operation at 2MHz. DMA transfers take place at full bus speed using the 6809 "cycle steal" transfer mode. Once the required parameters are passed to the Controller and DMA transfer is initiated, the processor is free for other tasks. Interrupts can be generated to indicate the completion of the transfer.

SINGLE and DOUBLE DENSITY data storage on any combination of 5 1/4" and 8" floppy drives; single and double sided, single and double track density (i.e., 40 or 80 track), up to 4 Drives total.

LOW ERROR RATES are insured by a phase lock data recovery circuit (data separator) and adjustable write precompensation circuitry for drives that require precomp. Separate precomp adjustments are provided for 5 1/4" and 8" drives.

ADDRESSABLE to any 8 byte boundary in the address space (1M byte when extended address decoding is used). The Board occupies only 8 bytes of address space.

EXTENDED ADDRESSING control using the SS-50C extended address lines. Control of the extended address lines allows the board to perform DMA transfers to and from any address in the 1M Byte address space.

FULLY BUFFERED with separate 5 1/4" and 8" output buffers and Schmidt Trigger input buffers for the disk drive signals.

The DMA Disk Controller Board also has several Option Jumper which allow the User to configure the unit to fit his specific needs. While GIMIX Floppy Disk System operation is not as fast as some of the other

Systems, I can not remember EVER having a "crashed" Disk in over two years of using this Controller. The "slow-down" is NOT caused by the Controller, but by the Disk I/O Software and the numerous checks made on each transfer. The Floppy Disk System JUST PLAIN WORKS!

#### The GIMIX Intelligent Serial I/O Processor Board

The GIMIX Intelligent Serial I/O Processor Board is a 30 Pin Card which provides three (3) RS-232C Serial Ports. It includes a 6809 CPU, a Z8038 FIFO, and three 6551A's, and can utilize up to 16K Memory, of which 8K can be RAM. The Intelligent Serial I/O Card can relieve much of the CPU's work load, again providing a more efficient overall System, by buffering data transfers and performing a certain amount of data preprocessing.

The GIMIX Intelligent I/O Boards are a new product to the normal SS-50 Bus Software Producers, so the overall effect of these units on system through-put can not be evaluated at this time. A combination of a "smart" line-oriented Terminal and the "smart" Serial Card should be a big help in programs like Word Processors, Electronic Spreadsheets, etc., once the Software has been converted from "character oriented" systems to "line oriented" systems. These new boards have been the source of most of the Software "bugs" noted originally.

#### GIMIX 19MB Hard Disk System

The GIMIX 19MB Hard Disk System consists of a 5.25" Winchester Hard Disk (which is the same size as a standard width 5 1/4" Disk Drive) and two 50 Pin Slot PC Boards; a Xebec S1410 Winchester Disk Controller Board is mounted on one of the SS-50 Bus Boards. If you have not had the pleasure of using a reliable Hard Disk, you are in for a shock. Disk accesses and transfers are FAST; Stylo's approx. 90 Sectors loads and initializes in about seven (7) SECONDS. In about two years of operation with this unit, we have only had one small problem (this was one of the original units). It, like the Floppy Disk System, JUST PLAIN WORKS!

The Hard Disk formats with 58,752 Sectors when formatted with the GMX III OS-9 System, which still utilizes the space as single sector "clusters". The biggest problem I had using the Hard Disk with FLEX was in trying to find a meaningful filename; OS-9, with its Directory System, has obviously eliminated that problem.

#### Summary

The overall GIMIX III Computer System is a "state of the Art" system which combines Hardware capabilities and the power of the 6809 CPU to provide better utilization of the powerful Operating Systems available for this CPU. As usual, Hardware Design has moved ahead of Software Design; once the Software producers have a chance to "fine tune" their Software to the specific capabilities of the GMX III System, still further improvements will be realized.

Finally, the GMX III System is not a "dead end" System. GIMIX has not officially announced their 68000 Board yet, but it will be designed as a direct replacement for the 6809 CPU Card and use all of the existing boards in the III System (in fact, the "Smart" Boards, with the 68809, actually provide faster data transfer than the 68000). The CPU will be a full 10 or 12 MHz 68000 (unlike the 68008 Boards that will be available for the SS-50 Bus shortly), and will use Microware's OS-9-68K (?? OS-9 for the 68000). Hopefully, GIMIX will provide some type of switching so that BOTH Boards can be installed in the System, allowing the use of present Software on the 6809 while Software is being developed for the 68000.

## REMOTE PULSE WIDTH

#### Remote Pulse Width Determination

An MC146805E2 CMOS microprocessor with EPROM monitor was interfaced to an Addressable Asynchronous Receiver/Transmitter. The microprocessor is configured by firmware to serve as a pulse width determination slave. The microprocessor divides its system clock by five and starts counting these pulses on the rising edge of the pulse to be measured. Two Schmitt triggers are used to trigger on the falling edge of the pulse to be measured. The output from the second Schmitt trigger is normally high and a low going pulse is applied to the IRQ pin when the falling edge of the pulse to be measured is detected. A IRQ interrupt is then generated and the timer data register is read and its contents output to the AART via port A of the MC146805E2. Firmware prevents an update of port A during an AART transmit. The AART in turn relays the hexadecimal value of the pulse width to the serial board on port 4. This transmission occurs at 4800 baud with an eight bit word, even parity, and one stop bit format. The EPROM monitor program SLAVE loops until it receives divide by information from MASTER which is running on the mainframe. The operator can divide by 1,2,4,8,16,32,64, or 128 by sending out the appropriate bit pattern by means of the AART command word to the appropriate port B inputs of the microprocessor. These bits are then shifted and AND'ed with a byte that will set up the timer control register to operate in the pulse width determination mode. Since rollovers were not of concern the timer control register was set up to mask timer interrupts. If one wishes to count rollovers a timer interrupt routine would have to be included in the monitor SLAVE firmware. The timer interrupt mask bit would then have to be cleared to insure response to timer interrupts.

MC146805E2 object code was generated by use of a Macro Cross Assembler. This code was then programmed into a 27C16 CMOS EPROM to produce the slave monitor.

A six volt rechargeable battery was used to power the circuitry since all devices were CMOS. Transmission back to the GIMIX serial card was understood in spite of the lack of a plus and minus supply at twelve volt levels. An important point to remember when building this circuit is to use a 47 microfarad filter capacitor as well as a couple of 0.1 microfarad bypass capacitors. If you don't want to fry eggs on your CMOS microprocessor, a battery isn't as continuous a source of electrical energy as one might think.

A small note of warning about the one shot circuit: this trick only works with CMOS Schmitt triggers. The bias currents at the input of any variety of TTL gate would charge up the capacitor and yield unpredictable results. Note, also, that there are two unused bits at the output port B of the processor; with a small effort one could decode these and monitor up to four pulse widths remotely. Alternately, these could initiate some response to a change of pulse width.

The source for the 307.2 kHz ceramic resonator is Radio Materials Company, 4242 N. Bryn Mawr Avenue, Chicago IL 60646. They have a \$150.00 minimum order.

A further feature of this circuit is that up to 128 other AART's can be used and addressed uniquely to ascertain pulse widths of various remote signals using the same receive, transmit and ground lines.

```

59.00= ORG $07FA
60.00= FCB $18
61.00= FCB $24
62.00= ORG $07FE
63.00= FCB $18
64.00= FCB $01

```

Jeffrey M. Craig  
Apt. 912 - 3001 S. King Dr.  
Chicago, IL 60616

Christopher J. Zolkowski  
3416 S. Hermitage  
Chicago, IL 60608

```

1.00=
2.00= WHEN CROSS ASSEMBLYING CALL A MACRO
3.00= LIB MAC6805
4.00=
5.00= THE NAME OF THIS PROGRAM IS SLAVE
6.00= NAM SLAVE
7.00= ORG $0001
8.00=
9.00= EQUATES ARE LOCATIONS OF MC146805E2
10.00= PORT AND TIMER REGISTERS
11.00=PDR A EQU $0000
12.00=PDR B EQU $0001
13.00=DRA EQU $0004
14.00=ODR B EQU $0005
15.00=TDR EQU $0008
16.00=TCR EQU $0009
17.00=
18.00= INITIALIZE PORT A
19.00= ALL ARE OUTPUTS
20.00= LDA #$FF
21.00= STA DRA
22.00= INITIALIZE PORT B
23.00= SOME ARE INPUTS SOME ARE OUTPUTS
24.00= LOA #$11000010
25.00= STA DRB
26.00= GO INTO LOOP WAITING FOR DIVIDE BY NUMBER
27.00=LOOP1 NOP
28.00= BRCLR 5,PDR B,LOOP1
29.00= GET DIVIDE BY NUMBER
30.00= LDA PDR B
31.00= GET BITS INTO PROPER LOCATION
32.00= LSRA
33.00= LSRA
34.00= ELIMINATE UNWANTED HIGH'S
35.00= AND #$00000111
36.00= MAKE BIT PATTERN TO IGNORE TIMER INTERRUPTS
37.00= MAKE BIT PATTERN FOR PULSE WIDTH MODE
38.00= ADD #$01010000
39.00= STA TCR
40.00= START COUNTER AT 0
41.00= LDA #$0
42.00= STA TDR
43.00= CLEAR INTERRUPT MASK
44.00= CLI
45.00= WAIT FOR INTERRUPT TO OCCUR
46.00=LOOP2 WAIT
47.00= BRA LOOP2
48.00=IRQ NOP
49.00=BRSET 0,PDR B,IRQ
50.00= LDA TDR
51.00= STA PDR A
52.00= LOA #$00000010
53.00= STA PDR B
54.00= START COUNTER AT 0 AGAIN
55.00= LDA #$0
56.00= STA TDR
57.00= RTI
58.00=
59.00= ORG $07FA
60.00= FCB $18
61.00= FCB $24
62.00= ORG $07FE
63.00= FCB $18
64.00= FCB $01

```

```

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16.00=TCR EQU $0009
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40.00= START COUNTER AT 0
41.00= LOA #$0
42.00= STA TDR
43.00= CLEAR INTERRUPT MASK
44.00= CLI
45.00= WAIT FOR INTERRUPT TO OCCUR
46.00=LOOP2 WAIT
47.00= BRA LOOP2
48.00=IRQ NOP
49.00=BRSET 0,PDR B,IRQ
50.00= LDA TDR
51.00= STA PDR A
52.00= LOA #$00000010
53.00= STA PDR B
54.00= START COUNTER AT 0 AGAIN
55.00= LOA #$0
56.00= STA TDR
57.00= RTI
58.00=
59.00= ORG $07FA
60.00= FCB $18
61.00= FCB $24
62.00= ORG $07FE
63.00= FCB $18
64.00= FCB $01

```

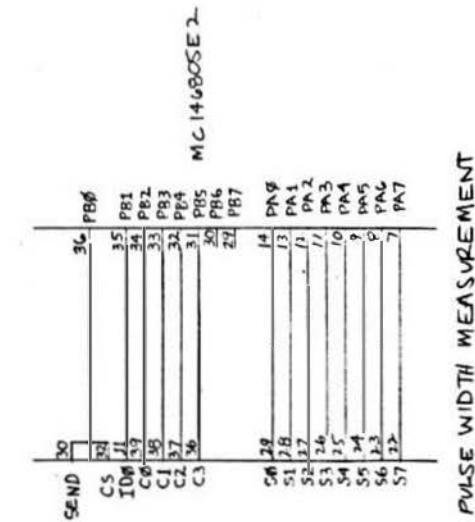
1.00=
2.00= THE NAME OF THIS PROGRAM IS MASTER
3.00= THE ROUTINES IN EQUATES ARE FLEX9
4.00= THE SERIAL CARD IS ON PORT 4

5.00= NAM MASTER  
6.00= OPT PAG  
7.00= ORG \$1000  
8.00=  
9.00=DATA EQU \$E011 THIS IS THE 6850'S DATA REGISTER  
10.00=CONTRL EQU \$E010 THIS IS THE 6850'S CONTROL REGISTER  
11.00=PCRLF EQU \$CD 24  
12.00=OUTHEX EQU \$C03C  
13.00=WARMS EQU \$CD 03  
14.00=OUTCH EQU \$CD 0F  
15.00=MEM EQU \$2000  
16.00=  
17.00=\* CONFIGURE 6850 TO DIVIDE INCOMING  
18.00=\* DATA BY 16 CLOCK  
19.00=\* CONFIGURE 6850 FOR 8 BITS, EVEN PARITY  
20.00=\* ONE STOP BIT  
21.00=BEGIN LOA A #\$00011001  
22.00= STA A CONTRL  
23.00=\* CHECK TO SEE IF TRANSMIT DATA REGISTER IS EMPTY  
24.00= JSR LOOP1  
25.00=\* ADDRESS THE APPROPRIATE AART  
26.00=CALL LDA A #\$10000000  
27.00= STA A DATA  
28.00= JSR LOOP1  
29.00=\* SEND OUT A COMMAND WORD  
30.00=\* SELECT A DIVIDE BY ONE  
31.00= LDA A #\$00001000  
32.00= STA A DATA  
33.00= JSR LOOP1  
34.00=\* CHECK TO SEE IF DATA HAS BEEN RECEIVED  
35.00=\* FROM THE AART  
36.00= JSR LOOP2  
37.00=\* GET DATA AND DISPLAY IT  
38.00= LDA A DATA  
39.00= STA A MEM  
40.00= JSR PCRLF  
41.00= LDX #MEM  
42.00= JSR OUTHEX  
43.00= LDA A #\$20  
44.00= JSR OUTCH  
45.00= JSR LOOP2  
46.00=\* GET SECOND WORD (PULSE WIDTH) AND DISPLAY IT  
47.00= LDA A DATA  
48.00= STA A MEM  
49.00= LDX #MEM  
50.00= JSR OUTHEX  
51.00= LDA A #\$20  
52.00= JSR OUTCH  
53.00= JSR PCRLF  
54.00=\* LET'S HAVE A COKE BREAK (DELAY)  
55.00= LDX #\$FFFF  
56.00=LOOP3 DEX  
57.00= CPX #\$0000  
58.00= BNE LOOP3  
59.00=\* LET'S GET ANOTHER TWO WORDS LIKE ABOVE  
60.00= JSR LOOP1  
61.00=CALL1 LDA A #\$10000000  
62.00= STA A DATA  
63.00= JSR LOOP1  
64.00= LDA A #\$00001000  
65.00= STA A DATA  
66.00= JSR LOOP1  
67.00= JSR LOOP2  
68.00= LDA A DATA  
69.00= STA A MEM  
70.00= JSR PCRLF  
71.00= LDX #MEM  
72.00= JSR OUTHEX  
73.00= LDA A #\$20  
74.00= JSR OUTCH  
75.00= JSR LOOP2  
76.00= LDA A DATA  
77.00= STA A MEM  
78.00= LDX #MEM  
79.00= JSR OUTHEX  
80.00= LDA A #\$20  
81.00= JSR OUTCH  
82.00= JSR PCRLF  
83.00=\* LET'S GO BACK TO FLEX9 DOS  
84.00= JMP WARMS

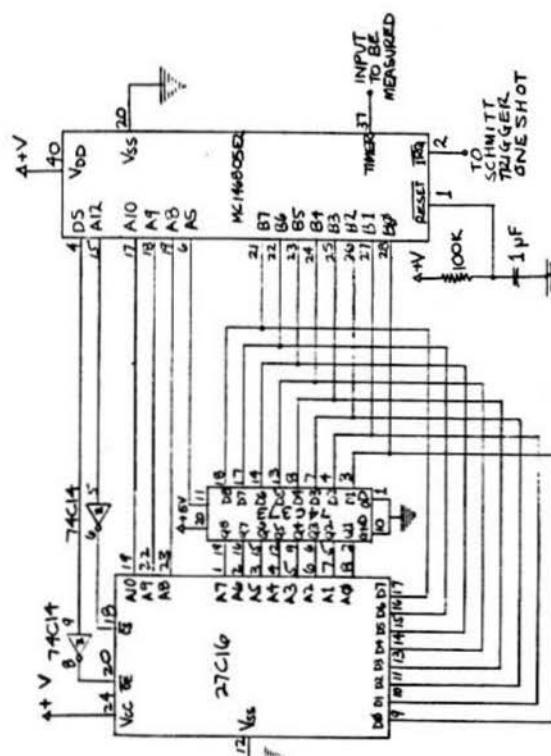
```

85.00=LOOP1 LDA A CONTRL
86.00= AND A #$00000010
87.00= CMP A #$00000010
88.00= BNE LOOP1
89.00= RTS
90.00=LOOP2 LDA A CONTRL
91.00= AND A #$00000001
92.00= CMP A #$00000001
93.00= BNE LOOP2
94.00= RTS
95.00= END BEGIN

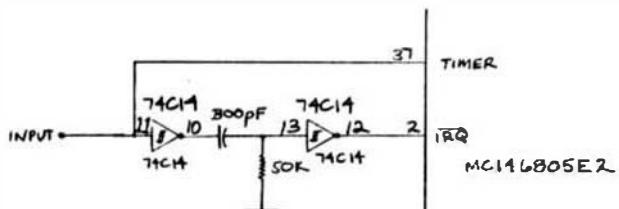
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REMOTE PULSE WIDTH MEASUREMENT

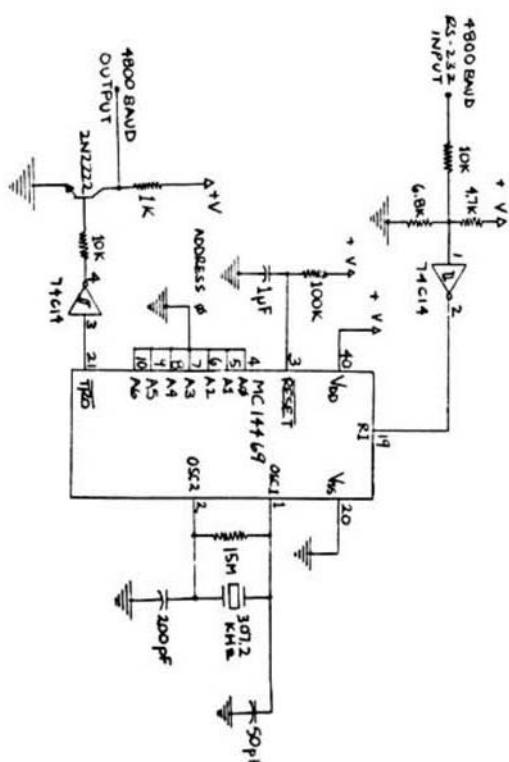


REMOTE PULSE WIDTH MEASUREMENT

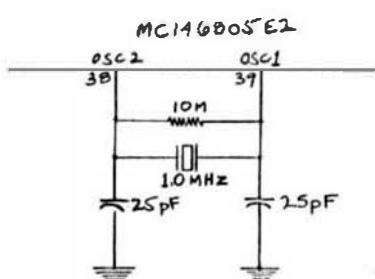


### SCHMITT TRIGGER ONE SHOT

## REMOTE PULSE WIDTH MEASUREMENT



REMOTE PULSE WIDTH MEASUREMENT



## SYSTEM CLOCK REMOTE PULSE WIDTH MEASUREMENT

## James Befano Dies of Heart Attack

James Bellomo of JOTO ASSOCIATES died February 25, 1984 of a heart attack. Jim was an active SS-50 Bus supporter, and was the "OS-9 Special Interest Group" system operator on Compuserve. He is survived by his wife Mako and 12 year old son David. At 34 years of age it seems that his family and our Industry were cheated of a truly dedicated and committed individual. Our prayers go out to his family at this time. Associates will continue to serve those who did business with Jim.

## **DAY COMMAND FOR FLEX-9**

Dear Larry:

I am enclosing a Flex-9 disk containing an article for '68' Micro, entitled "DAY Command for Flex-9" and the source and command files for this utility. I really like DAY.CMD and I trust your readers will benefit from it. Maybe you should have a "utility of the month club"?

Yours Truly

J. Gary Mills

Ed's Note: Thanks Gary, sounds like a great idea, now how about the rest of you? Send in your favorite utility (non-copyrighted) and win subscription renewals, books and/or world fame! DMW

### RAY Command for Flex-9

J. Gary Mills  
1019 Weatherdon Ave.  
Winnipeg, Manitoba  
Canada B3M 2B5

Here is a utility for Flex-9 that makes your system a little more friendly. The DAY command simply displays the current day of the week plus the date, month, and year.

An example 1s: "Sunday, 29 January 1984".

It is an alternative to the DATE command.

I use it as a part of my startup file to confirm that I have entered the correct date. I also use it to annotate printer listings, for example: "P DAY-P LIST filename".

Each element of the display is produced by a separate subroutine. This makes it easy to change the format by re-arranging the LBSR statements. Flex users in the USA may wish, for example, to have it say: "Sunday, January 29, 1984".

Although the utility runs in the Utility Command Area, it is written in position-independent code. It examines the Flex date register and calculates the day of the week. This requires some "astronomical" calculations, including 3-byte arithmetic and floating point simulation by

fractions. The algorithm is explained in the comments of the DAYPRT routine. This routine calls routines that emulate a CPU with a 24-bit accumulator. The result of the calculation is a number between zero and six, corresponding to a day between Sunday and Saturday. The address of the string which is printed is obtained from an index that precedes the group of strings.

- - -

\*  
\* "DAY" COMMAND  
\*

\* AUTHOR: J. GARY MILLS  
\* 1019 WEATHERDON AVE  
\* WINNIPEG, MAN  
\* CANADA R3M 2B5

\* FLEI ADDRESSES

C003	WARM	EQU	SC003	FLEI RETURN POINT	C142	C1	02	CMPB	#2	IF MONTH > 2
CD18	PUTCHR	EQU	SCD18	PUT A CHAR TO CONSOLE	C144	C3	0F	BLS	#407	
CD24	PCALF	EQU	SCD24	START NEW LINE ON CONSOLE	C146	SC		INC0		
CD39	OUTDEC	EQU	SCD39	PRINT A DECIMAL NUMBER	C147	E7	8C C1	STB	MON+2,PCR	. MONTH := MONTH + 1
CC0E	SYBR	EQU	SCC0E	SYSTEM DATE REGISTER	C148	F6	CC10	LDB	SYDR	
CC0E	SYDR	EQU	SYDR+0	. MONTH	C14D	C3	076C	ADD0	#1900	
CC0F	SYDR	EQU	SYDR+1	. DAY	C150	ED	8C 3A	STD	YEA+1,PCR	
CC10	SYDR	EQU	SYDR+2	. YEAR	C153	20	0E	BRA	DA12	ELSE

C100 C100 20 16 DAYCMD BRA ORG SC100 UCA  
C102 01 FCB 1 DISPLAY

\* VARIABLES

C103	ACC	RMB	3	ACCUMULATOR	C170	BD	48	BSR	ADD3	DAY := DAY + ACC
C106	DAY	RMB	3	DAY	C170	BD	39	BSR	STDR	
C109	MON	RMB	3	MONTH	C17F	31	8C 90	LEAY	K2,PCR	
C10C	YEA	RMB	3	YEAR	C182	BD	27	BSR	LOAD	

\* CONSTANTS

C10F 00	K1	FCB	0	365.25	C184	31	8C 82	LEAY	MON,PCR	ACC := MONTH + 30.6
C110 0160		FDB	365		C187	BD	6F	BSR	MULT	
C112 00	K2	FCB	0	30.6	C189	C6	01	LDB	0I	
C113 001E		FDB	30		C18B	BD	4B	BSR	SRAB	
C115 F6 B6 07	K3	FCB	0F6.0B6.007	-621049	C18D	C6	03	LDB	0J	

\* PRINT FORMATTED DAY AND DATE

C118 BD	CD24	JSA	PCRLF	START NEW LINE	C191	31	8C 81	LEAY	K3,PCR	
>C11B 17	0015	LBSR	DAYPRT	PRINT DAY	C194	BD	2F	BSR	ADD3	
C11E 17	013B	LBSR	CONSPA	PRINT COMMA AND SPACE	C196	31	BD FF6C	LEAY	DAY,PCR	
C121 37	0141	LBSR	DATPRT	PRINT DATE	C19A	BD	29	BSR	ADD3	DAY := DAY + ACC - 621049
C124 17	0139	LBSR	SPACE	PRINT A SPACE	C19C	BD	1A	BSR	STOR	
C127 17	0149	LBSR	MONPRT	PRINT MONTH	C19E	17	0090	LBSR	RENDR	CALC MODULUS 7
C12A 17	0133	LBSR	SPACE	PRINT A SPACE	C1A1	30	BD 00E6	LEAI	DINDEX,PCR --> INDEX	
C12D 17	0151	LBSR	YEAPRT	PRINT YEAR	C1A5	E6	86	LDB	A,I	LOOKUP
C130 7E	CD03	JMP	WARM	GOTO FLEI	C1A7	3A		ABI	--> NAME	

\* PRINT THE CURRENT DAY OF THE WEEK

C133 CC	0000	LDB	00		C1A8	EC	21	LDD	1,Y	
C136 ED	8C CD	STD	DAY,PCR	C1C5	EC	80 FF39	ADD9	ACC+1,PCR		
C139 ED	8C CD	STD	MON,PCR	C1C7	E3	80 FF39	ADD9	ACC+1,PCR		
C13C ED	8C CD	STD	YEA,PCR	C1CB	ED	80 FF35	STD	ACC+1,PCR		
C13F F6	CC0E	LDB	SYDR	C1CF	A6	84	LDA	0,Y		

\* LOAD 3-BYTE ACCUMULATOR

* Y --> SOURCE	C1AB	LOAD	EQU	*
C1AB	EC	21	LDD	1,Y
C1AB	ED	80 FF53	STD	ACC+1,PCR
C1B1	A6	84	LDA	0,Y
C1B3	A7	80 FF4C	STA	ACC,PCR
C1B7	39		RTS	

\* STORE 3-BYTE ACCUMULATOR

* Y --> DESTINATION	C1B8	STOR	EQU	*
C1B9	EC	80 FF4B	LDD	ACC+1,PCR
C1B9	ED	21	STD	1,Y
C1B9	A6	80 FF41	LDA	ACC,PCR
C1C2	A7	84	STA	0,Y
C1C4	39		RTS	

\* ADD 3-BYTE NUMBER TO ACCUMULATOR

* Y --> NUMBER	C1C5	ADD3	EQU	*
C1C5	EC	21	LDD	1,Y
C1C7	E3	80 FF39	ADD9	ACC+1,PCR
C1CB	ED	80 FF35	STD	ACC+1,PCR
C1CF	A6	84	LDA	0,Y
C1D1	A9	80 FF2E	ADC9	ACC,PCR
C1D5	A7	80 FF2A	STA	ACC,PCR
C1D9	39		RTS	

## FOR THE ELEKTRA

- **OS-9** with Editor, Assembler, and Debugger **\$250.00**
- **STAR-DOS Level 1** (FLEX™ compatible but with up to 10 active drives:  
i.e. 4 8" floppies, 4 5" floppies, and 2 Winchester drives)  
Regular price **\$75.00** Introductory price **\$50.00**

## FOR OS-9 by Epstein Associates

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- Coming — Complete software for Western Union EasyLink

## THE ELEKTRA SUPER FLOPPY CONTROLLER

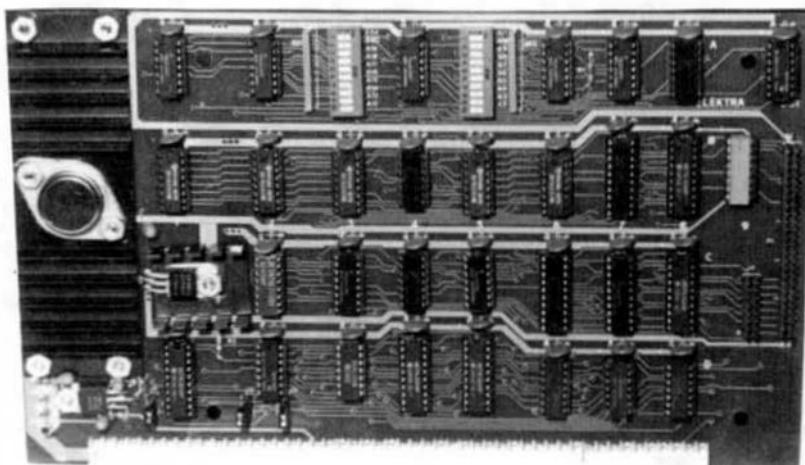
- Emulates the DC-1, DC-2, DC-3, DC-4 as well as the GIMIX #28, #38, #48, and #58 controllers **\$275.00**

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<b>New</b>	7 Megabyte Single Drive System	<b>\$1995.00</b>	14 Megabyte Dual Drive System	<b>\$2995.00</b>
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<b>New</b>	Winchester Electronics (no drives)			<b>\$995.00</b>
<b>New</b>	DMA SS-50C Bus Interface (No controller nor drives)			<b>\$695.00</b>

## THE ELEKTRA DBI BOARD

(DMA SS-50C Bus Interface for the ELEKTRA Winchester Systems)



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DMA 5" and 8" Floppy Controller	\$495.00	6809 CPU Board	495.00		
68008 board for SS-50	595.00	C/P/M-68K	350.00		
Need FLEX, UniFLEX, OS-9 Level I, or OS-9 Level II? We have a system for you!					
<b>ELEKTRA COMPUTER CABINET</b> THE LARGEST SS-50 COMPUTER CABINET AVAILABLE! Made of heavy-weight 0.090" thick aluminum. Interior 18-1/2" wide by 21-7/8" deep by 8-3/4" high. Heavy duty A/C line cord, A/C fuse holder, EMI filter, Fan with filter. Back panel has 10 outlets for D-type data connectors. Front panel has key on/off power switch, 2 illuminated push button switches (Reset and NMI/Abnormal) and two cutouts for 3-1/4" disk drives. \$250.00					
Filter Plate for 5-1/4" drive opening: \$10.00		Fan Filter: \$10.00			
<b>POWER SUPPLY</b> Highest quality linear power supply CONSERVAT: ELY rated at 15a @ 6v, 3a @ 16v, 3a @ 19v. Multi-TAD905 Primary for line tuning \$200.00					
<b>DISK REGULATOR BOARD WITH CABLES</b> Standard version for 2 floppy drives \$50.00 Heavy duty version for 1 Winchester drive and 1 floppy drive \$75.00					
<b>AUXILIARY POWER SUPPLY</b> 10 power second Winchester drive \$125.00					
<b>ELEKTRA UNIVERSAL SS-256K-SMC</b> SOTEREX CERO Processor 0.125" thick 18" long by 9" wide. 11 memory (150 pin) with 8 I/O (30 pin) slots. Complete address decoding and expansion logic. Up to 16 memory modules expandability for 16 I/O slots. Choice of 4, 8 or 16 addresses per I/O port. 1" spacing between all memory and I/O slots. On board baud rate generator with low and high ranges providing jumper selectable rates of 75 through 38,400 for each of the five baud rate lines. Above device circuitry permitting 1 Mbit 20 pin disk controllers to run with 2MHz 50 pin CPU board.					
Mounting hardware \$15.00 Bareboard w/documentation: \$80.00 Kit w/gold connectors: \$400.00 Assembled w/gold connectors: \$460.00 Kit with connectors: \$320.00 Assembled with connectors: \$380.00					
<b>ELEKTRA CHASSIS</b> includes cabinet, 110v power supply, power supply cables, standard disk regulator board with power cables, motherboard with gold square pin connectors, assembled and tested. \$950.00					
<b>ELEKTRA CPU 8/9</b> Use either the 6802 or 6808 (to run 6800 software) or 6809. Has provision for up to 3 2716 EPROMs, 15 scratchpad, MC6840 triple timer, and an optional baud rate generator providing baud rates from 110 through 38,400 baud in two user selectable ranges. Run O-8, FLEX*, STAR-DOS. Bareboard: \$50.00 Kit: \$225.00 Assembled: \$215.00 Optional Baud Rate Generator: \$25.00					
<b>ELEKTRA OPS DUAL PORT SERIAL CARD</b> Fits the standard 30 pin SS-50 bus/I/O slot. Can be configured for 4 or 16 addresses per port. RTS, CTS, DTR, DCD, IRO, FIRO/NMI, and baud rate can be appropriately implemented for each port. Bareboard: \$20.00 Kit: \$75.00 Assembled: \$95.00 Cable (two needed per board) Each: \$20.00					
<b>ELEKTRA DPP DUAL PORT PARALLEL CARD</b> Fits the standard 30 pin SS-50 bus/I/O slot. Can be configured for 4 or 16 addresses per I/O slot. The direction of the TTL buffers can be controlled by either on board jumper connectors or by a signal from the peripherals. The interrupt request line for each port may be individually jumpered to either the IRO or FIRO/NMI bus line. Bareboard: \$20.00 Kit: \$60.00 Assembled: \$80.00 Cable (two needed per board) Each: \$20.00					
<b>ELEKTRA 64K STATIC RAM/ROM MEMORY BOARDS</b> with gold connectors (in available) Assembled and tested With 58K RAM \$269.00 With 64K RAM \$299.00 Kit With 58K RAM \$219.00 With 64K RAM \$249.00					
<b>ELEKTRA UNIVERSAL SUPER FLOPPY CONTROLLER</b> THE BEST 30 PIN FLOPPY DISK CONTROLLER THAT YOU CAN BUY! Controls up to four 5-1/4" drives and four 8" drives for a total of eight system drives. (FLEX system limit is four drives) Single density or double density, 1MHz or 2MHz. 6800 or 6809. (Double density 8" must be at 2MHz, all other combinations of performances are possible) Analog phase locked loop data separators with separate adjustments for 5" and 8" drives. Analog write precompensation circuit with separate adjustments for 5" and 8" drives. Designed to meet the data hold requirements of Western Digital floppy controller IC. Assembled and tested. \$275.00 Disk with drivers, setup, and formatting utilities. Specify 6800 (FLEX2 or Gen. FLEX), or 6809 (FLEX9 or Gen. FLEX), or OS-9, 5" or 8". Regular price: \$75.00 Introductory price: 50.00 STAR-DOS (Specify 5" or 8")					
<b>ELEKTRA WINCHESTER SYSTEMS</b> THE BEST WINCHESTER SYSTEMS THAT YOU CAN BUY! Has automatic error detection and CORRECTION of up to 11 bit burst errors. SS-50 bus, extended memory, and capabilities. DMA on board sector buffer. Drivers included for 6802 FLEX or OS-9. Specify whose version of FLEX that you are using. Drivers for Ft. Ex2 (6800) are available for an additional \$100.00. Price includes interface controller, drives, and cables.					
7 Megabyte single drive sys. \$1995.00 16 Megabyte dual drive sys. \$2995.00 12 Megabyte single drive sys. \$2299.00 24 Megabyte dual drive sys. \$3399.00 19 Megabyte single drive sys. \$2995.00 36 Megabyte dual drive sys. \$4695.00 18 Megabyte drives are the largest that can be supported by FLEX)					
Circuit boards, cables, software I/O drives: 995.00 SS-50C DMA Bus Interface board only 695.00					
<b>ELEKTRA HD-5</b> Cabinet for dual 5-1/4" floppy drives with power supply, line cord, fuse power switch, and power cables to drives 150.00					
<b>ELEKTRA HD-8W</b> As above but with EMI filter, fan, and heavy duty power supply. Power 1 floppy and 1 Winchester 199.00					
5" ribbon cable for dual outboard 5-1/4" disk drives 40.00 2" ribbon cable for dual inboard 5-1/4" disk drives 35.00 Custom cables available Phone					
<b>ELEKTRA HD-8</b> Drive cabinet, EMI filter, fan with filter, power supply and power supply cables 350.00					
5" ribbon cable for dual 8" disk drives 45.00					
<b>ELEKTRA 30 PIN PROTOTYPING BOARD</b> 20.00					
<b>ELEKTRA 60 PIN PROTOTYPING BOARD</b> 40.00					
<b>GOLD 10 PIN CONNECTORS</b> (Specify male with square pins or female) 1.50					
<b>TIN 10 PIN CONNECTORS</b> (Specify male with square pins or female) 50					
<b>ELEKTRA</b> is a trademark of AAA Chicago Computer Center. <b>FLEX</b> and <b>UniFLEX</b> are trademarks of Technical Systems Consultants, Inc. <b>HELI</b> is a trademark of Hazelwood Computer Systems. OS-9 and <b>BASIC09</b> are trademarks of Microware Systems Corp.					

<b>AAA CHICAGO COMPUTER CENTER</b>	(312) 459-0450
120 CHESTNUT LANE • WHEELING, IL 60090	
Technical consultation available 4 PM to 6 PM most weekdays. Closed evenings and weekends.	

TERMS Minimum order \$20.00. Shipping and handling estimates within the Continental U.S., add 3% (MINIMUM \$2.50). Illinois residents add 6% sales tax. We will refund your overestimated shipping and handling charges. Foreign shipping and handling, add 10% (MINIMUM \$10.00). Foreign orders must be prepaid in U.S. dollars. Checks must be drawn on a U.S. bank. Heavy foreign items will be shipped air freight collect. Please phone between 4 PM and 6 PM weekdays if questions arise regarding shipping fees. Master Charge, Visa, and American Express honored.

Our apology. We are not staffed to answer technical inquiries through the mail. Please phone for technical help during the hours indicated above. The low frequent charging of our inventory and prices makes it uneconomical to publish a catalog. Our ads are intended to serve that purpose. Prices and inventory are subject to change without advance notice.

**ELEKTRA "SOFTWARE** (All of our software is copyrighted and all rights are reserved. Source is either supplied or optionally available at extra cost so that the purchaser can modify our programs for his own use. Licensing, however, is required for commercial resale.)

**SUPER MODEM PROGRAM** Single character commands. No interrupts required. Transmit manually or transmit disk files (text) of any length to distant computer. Receive and save disk files (text) on local disk system. X-on/X-off supported. Tested for full duplex at speeds up to 9600 baud. Half duplex option. Echo option. Replaces CR with CR/LF (user option). Slow disk file transmit option.

Please specify 6800 or 6809, SSB or FLEX\*, 5" or 8". Instruction Manual and disk with both source and object code \$75.00

**STANDARD MODEM PROGRAM** Same as Super Modem Program above but without ECHO option, CR/LF for CR option, slow disk file transmit option, nor X-on/X-off option. specify 6800 or 6809

Manual with instructions, source listing, and flow chart 45.00

**OS-9 Configurable Modem Program** (Sorry, source is not available) 100.00

**ORDER — WRITE UP COMPUTER PROGRAM** Screen oriented write up form with cursor editing, disk save and load, printer command using easily available universal print-out forms. Phone for more details. Available for 6809 FLEX. \$100.00

**ALL IN ONE**

Editor — Text Processor — Mailing Labels — Mailing Lists — Multiple Form Letters Use any CRT terminal and printer — Best Package For The Money Anywhere!

Specify 6800 or 6809, SSB or FLEX\*, 5" or 8". Add \$35.00 for printer source listing. Add \$100 for source on disk.

All-In-One, Write on Spell, and Spell'n Fix package 250.00

**Software by Technical Systems Consultants, Inc.**

	Flex*	UniFlex*				
System	Source	Source	Man. Only	Object	Man. Only	Object
Gen. DOS w/Edit & ASMB	25	50	250	—	—	—
SWTPC DOS w/Edit & ASMB	—	25	150	40	100	550
Advanced Programmers Guide	—	25	—	—	—	—
Editor	100	250	25	50	—	—
Assembler	150	250	25	50	—	—
Debug	175	250	25	75	—	—
Extended Basic	—	25	100	20	50	200
Basic Precompiler	—	25	50	10	25	150
Sort-Merge	—	25	75	20	35	150
Utilities	—	Inc.	25	75	10	150
Diagnostics	—	25	75	—	—	—
Text Processor	150	250	25	75	20	150
68000 X-ASMB on 6809	—	25	250	20	35	300
Pascal	—	50	200	25	50	300
Rel ASMB/Linking Loader	—	25	150	20	35	175
68000 X-ASMB on 6809	—	—	100	—	—	—
Cobol	—	—	—	30	75	750
Fortran 77	—	—	—	35	65	450

Software by Microware Systems Corp.	Run-Time Package	Source	Man.	Object	Opn
(Suggested List Prices, varies/mfg)	Only				
OS-9 Level 1 w/Edit, Asm, Debug	400.00	40.00			250.00
OS-9 Level 2 w/Edit, Asm, Debug	400.00	40.00			500.00
OS-9 Edit, Asm, Debug Pkg			25.00		125.00
Device Driver for Disk Controller (Specify Model)	100.00				
Device Driver for ACIA and PIA	50.00				
Clock Driver for 6840 and 58167 clock chips	35.00				
Entertainment Pack 1, or File Handler Toolbox, or NineCom					
Print Spooler (Level 2 only)	10.00				85.00
Virtual Disk Driver (Level 2 only)	15.00				150.00
ROM Programmable Macro Assembler	10.00				85.00
RMA/68000 Cross Assembler	20.00				200.00
BASIC9 W/Run-Time	50.00	N/A	25.00		200.00
BASIC9 Tour Guide Book	50.00	N/A	18.95		18.95
C Programming Language (Kernighan & Ritchie)	19.95				250.00
CIS Cobol Compiler w/Forms 2 Prog. Gen.	50.00	N/A	40.00		400.00
Pascal Compiler	50.00	N/A	25.00		250.00
Sage Application Generator	300.00	N/A	25.00		995.00
Microware yearly support service (All products)					150.00
Edit Update w/manuals	25.00				75.00
Version Update w/manuals					

Special Software	Introductory Price			
STAR-DOS Level 1	\$75.00			
2K 6809 MICROBUG	40.00			
2K 6800 HUMBUG	40.00			
Other HUMBUG versions including video versions are available.				
Spell'n Fix by Peter Stark	178.58			
Write'n Spell by Peter Stark	75.11			
All-in-One, Spell'n Fix, and Write'n Spell package	250.00			
SUPER SLEUTH Disassembler System (\$101.00 for OS-9 version)	99.00			
<b>SD/DD DISK DRIVES</b>				
30 day guarantee	1 head 2 heads 2 heads 1 head 2 heads			
Tandon	Tandon	CDC	MP1	MP1
5-1/4", 40 tracks	225.00	300.00	300.00	250.00
5-1/4", 80 tracks	300.00	375.00	375.00	325.00
5-1/4", 40 track CDC Service Manual (Specify 40 or 80 track)				400.00
8", 77 tracks DS/DD	Qume DT-8 \$550.00			Remex (Special) 350.00

SPECIALS		
U.S. Robotics 300/1200 baud auto dial auto answer modem	499.00	
Same as above but without self test and diagnostics	399.00	
U.S. Robotics 1200 baud direct connect auto answer modem	299.00	
SSB BFD Floppy Disk Controller (Version 3) Run FLEX or SSB DOS	100.00	
SWTPC 4K Memory	\$15.00	
MP-Mb (4K bareboard)	9.95	
High speed tape reader	50.00	
300 Baud acoustic modem	129.00	
T1 B10 Printer w/lower case and full vertical forms control	1200.00	
Microline II Calendar and Clock Board	Assembled 60.00	
<b>GIMIX CLEARANCE SALE</b>		
LIST PRICE	LIST PRICE	
#5 6809 Plus CPU Bd.	578.05	475.00
Cable (Ser or Par I/O)	24.95	20.00
Double disk reg. card	68.22	50.00
80 X 24 Video Boards	398.75	250.00
64 X 16 Video Boards	198.71	100.00
16K Mem Bds. w/ctrlr reg.	145.00	4K PROM Bd. and burner
93L422 RAM chips (2 needed for GIMIX DATA)		each 20.00

SWTPC	
MP-S2 Dual Port Serial	120.00
MP-N Calculator Board (kit)	54.95
MP-R 2716 EPROM Programmer	114.50
S-32 RAM not included	
MP-09 2MHz 6809 CPU Board	295.00

Smoke Signal Broadcasting	
DCB-4A Double Density Controller Board for 5" and 8" with DOS	\$49.00
SCB-69 6809 CPU Board	399.00

**WARNING** AAA Chicago Computer Center does not provide repair or diagnostic service for customer assembled kits. AAA Chicago Computer Center does warranty and maintain service for our assembled boards. The customer should carefully take into consideration the small differential separating out kit and assembled prices when making his choice of purchase.

We have introduced our line of computer equipment with the purpose of offering the highest quality of components possible at affordable prices. These products are intended for OEM applications where it is the responsibility of the purchaser to integrate these components with suitable memory, disk controllers, drives, and software along with I/O terminals to form working computer systems.

\* RIGHT-SHIFT 2-BYTE NUMBER & ADD TO ACCUMULATOR  
 \* Y --> NUMBER  
 \* B = BIT COUNT  
 C1DA SRAD EQU \*  
 C1DA 34 04 PSHS B  
 C1DC EC 21 LDD 1,Y  
 C1DE 44 SR01 LSRA  
 C1DF 56 RORB  
 C1E0 6A E4 DEC 0,S  
 C1E2 26 FA BNE SR01  
 C1E4 E3 80 FF1C ADDD ACC+1,PCR  
 C1E8 ED 80 FF18 STB ACC+1,PCR  
 C1EC A6 80 FF13 LDA ACC,PCR  
 C1F0 89 00 ADCA 00  
 C1F2 A7 80 FF0D STA ACC,PCR  
 C1F6 35 B4 PULS B,PC

\* MULTIPLY TWO 2-BYTE NUMBERS  
 \* Y --> NUMBER ACC = NUMBER  
 \* ACC = RESULT  
 C1F8 MULT EQU \*  
 C1F8 32 70 LEAS -3,S  
 C1FA 6F E4 CLR 0,S  
 C1FC A6 80 FF05 LDA ACC+2,PCR  
 C200 E6 22 LDB 2,Y  
 C202 3D MUL  
 C203 ED 61 STB 1,S  
 C205 A6 80 FEF8 LDA ACC+1,PCR  
 C209 E6 22 LDB 2,Y  
 C20B 3D MUL  
 C20C E3 E4 ADDD 0,S  
 C20E E0 E4 STD 0,S  
 C210 A6 80 FEF1 LDA ACC+2,PCR  
 C214 E6 21 LDB 1,Y  
 C216 3D MUL  
 C217 E3 E4 ADDD 0,S  
 C219 ED E4 STB 0,S  
 C21B A6 80 FEES LDA ACC+1,PCR  
 C21F E6 21 LDB 1,Y  
 C221 3D MUL  
 C222 E9 E4 ADDD 0,S  
 C224 E7 80 FED0 STB ACC,PCR  
 C226 EC 41 LDB 1,B  
 C228 E9 80 FED6 STB ACC+1,PCR  
 C22E 32 63 LEAS 3,B  
 C230 39 RTB

\* CALC REMAINDER ON DIVISION BY SEVEN  
 \* Y --> 3-BYTE NUMBER  
 \* A = REMAINDER  
 C231 REMDR EQU \*  
 C231 6b 10 LDB 816  
 C233 34 T4 PSHS 6  
 C235 EC A4 LDB 0,Y  
 C237 68 22 RE01 LSL 2,Y  
 C239 59 ROLB  
 C23A 49 BOLA  
 C23B 24 04 BCC RE02  
 C23D 88 07 ADDA 87  
 C23F 20 04 BRA RE03  
 C241 80 07 RE02 SUBA 87  
 C243 6C 22 INC 2,Y  
 C245 6A E4 RE03 DEC 0,S  
 C247 26 EE BNE RE01  
 C249 40 TSTA  
 C24A 2A 02 BPL RE04  
 C24C 88 07 ADDA 87  
 C24E 35 84 RE04 PULS B,PC

\* PRINT A STRING  
 \* X --> STRING

C250 A6 80 P001 LDA .X+  
 C252 B1 04 C00A B304  
 C254 27 05 BEQ P002  
 C256 BD C018 JSR PUTCHR  
 C258 20 F5 BRA P001  
 C25B 39 P002 RTS

\* PRINT A COMMA AND A SPACE  
 C25C 86 2C COMSPA EQU \*  
 C25E 80 02 LDA ' ',  
 BSR SPO1

\* FALL INTO SPACE

\* PRINT A SPACE  
 C260 86 20 SPACE EQU \*  
 C262 7E C018 SPO1 JMP PUTCHR

\* PRINT THE CURRENT DATE  
 C265 DATPAT EQU \*  
 C265 4F CLRA  
 C266 F6 CC0F LDB SYRD  
 C269 30 8D FE97 DA01 LEA ACC+1,PCR  
 C26B ED 84 STD 0,I  
 C26F 5F CLRB  
 C270 7E C039 JMP OUTDEC

\* PRINT THE CURRENT MONTH  
 C273 MONPRY EQU \*  
 C273 B6 CC0E LDA SYDM  
 C276 4A DECA  
 C277 30 8D 0050 LEA MINB1,PCR --> INDEX  
 C278 E6 86 LDB A,I LOOKUP  
 C27D 3A ABI --> NAME  
 C27E 16 FF0F LBRA PDATA PRINT IT

\* PRINT THE CURRENT YEAR  
 C281 YEAPRT EQU \*  
 C281 4F CLRA  
 C282 F6 CC10 LDB SYRY  
 C285 C3 876C ADDU B1Y0U  
 C288 16 FF0E LBRA DA01

\* INDEX FOR DAY STRINGS  
 C288 DINDEX EQU \*  
 C288 07 FCB DASUN-DINDEX  
 C28C 0E FCB DAMON-DINDEX  
 C28D 15 FCB DATUE-DINDEX  
 C28E 1B FCB DATED-DINDEX  
 C28F 27 FCB DATHU-DINDEX  
 C290 30 FCB DAFRI-DINDEX  
 C291 37 FCB DASAT-DINDEX

\* DAY STRINGS

C292 53 75 6E 64 DASUN FCC "Sunday"  
 C296 61 79 FCB 804  
 C298 04 FCB 804  
 C299 40 6F 6E 64 DAMON FCC "Monday"  
 C29D 61 79 FCB 804  
 C29F 04 FCB 804  
 C2A0 54 75 65 73 DATUE FCC "Tuesday"  
 C2A4 64 61 79 FCB 804  
 C2A7 04 FCB 804  
 C2A8 57 65 64 6E DAFRI FCC "Wednesday"  
 C2AC 65 73 64 61 FCB 804

C2B0 79			
C2B1 04		FCB	\$04
C2B2 54 6B 75 72	DATHU	FCC	"Thursday"
C2B6 73 64 61 79			
C2B8 04		FCB	\$04
C2B8 46 72 69 64	DAFR1	FCC	"Friday"
C2BF 61 79			
C2C1 04		FCB	\$04
C2C2 53 61 74 75	DASAT	FCC	"Saturday"
C2C6 72 64 61 79			
C2CA 04		FCB	\$04

DATHU	C2B2	DATPRT	C265	DATUE	C2A0	DNWED	C2AB	DAY	C106
DAYCMD	C100	DAYPRT	C133	DINDEX	C2BB	DISPLA	C11B	RI	C10F
K2	C112	K3	C115	LOAD	C1AB	MINDEX	C2CB	MDAPR	C2EE
MOAUG	C302	MODEC	C324	MOFEB	C2DF	MOJAN	C2D7	MOJUL	C2FD
MOJUN	C2FB	MONAR	C2EB	MONAY	C2F4	MON	C109	MONBV	C31B
MONPRT	C273	MOOCT	C313	MOSEP	C309	MULT	C1FB	OUTDEC	C039
PCRLF	C024	P001	C250	P002	C25B	PDATA	C250	PUTCHR	C018
RE01	C237	RE02	C241	RE03	C245	RE04	C24E	REMDR	C231
SP01	C262	SPACE	C260	SROL	C1DE	SRAD	C1DA	STD	C1BB
SYDR	CC0E	SYDRD	CC0F	SYORM	CC0E	SYDRY	CC10	WARM	CD03
YEA	C10C	YEAPRT	C281						

+ INDEX FOR MONTH STRINGS

C2CB 0C	MINDEX	ERU	*
C2CC 16		FCB	MOJAN-MINDEX
C2CD 10		FCB	MOFEB-MINDEX
C2CE 23		FCB	MONAR-MINDEX
C2CF 29		FCB	MOAPR-MINDEX
C2D0 20		FCB	MOJUN-MINDEX
C2D1 32		FCB	MOJUL-MINDEX
C2D2 37		FCB	MOAUG-MINDEX
C2D3 3E		FCB	MOSEP-MINDEX
C2D4 4B		FCB	MOOCT-MINDEX
C2D5 50		FCB	MONOV-MINDEX
C2D6 59		FCB	MODEC-MINDEX

+ MONTH STRINGS

C2D7 4A 61 6E 75	MOJAN	FCC	"January"
C2D8 61 72 79			
C2D9 04		FCB	\$04
C2D9 46 65 62 72	MOFEB	FCC	"February"
C2E3 75 61 72 79			
C2E7 04		FCB	\$04
C2E8 40 61 72 63	MONAR	FCC	"March"
C2EC 6B			
C2ED 04		FCB	\$04
C2EE 4L 70 72 69	MOAPR	FCC	"April"
C2F2 6C			
C2F3 04		FCB	\$04
C2F4 4D 61 79	MOJUN	FCC	"May"
C2F7 04		FCB	\$04
C2F8 4A 75 6E 65	MOJUN	FCC	"June"
C2FC 04		FCB	\$04
C2FD 4A 75 6C 79	MOJUL	FCC	"July"
C301 04		FCB	\$04
C302 4L 75 67 75	MOAUG	FCC	"August"
C306 73 74			
C308 04		FCB	\$04
C309 53 65 70 74	MOSEP	FCC	"September"
C30D 65 60 62 65			
C311 72			
C312 04		FCB	\$04
C313 4F 63 74 6F	MOOCT	FCC	"October"
C317 62 65 72			
C31A 04		FCB	\$04
C31B 4E 6F 76 65	MONOV	FCC	"November"
C31F 60 62 65 72			
C323 04		FCB	\$04
C324 44 65 63 65	MODEC	FCC	"December"
C328 60 62 65 72			
C32C 04		FCB	\$04

END DAYCMD

0 ERROR(S) DETECTED

SYMBOL TABLE:

ACC	C103	ADD3	C1C5	COMSPA	C25C	DAO1	C269	DAO7	C155
DA12	C163	DAFR1	C2BB	DAMON	C299	DASAT	C2C2	DASUN	C292

# BIT BUCKET

## OS-9 USER GROUP NEWS

### CONTINUED

#### OS-9 Users Group Abroad

Our communications points for Europe and Japan respectively will be:

Dr. Rudolf Keil  
Keil Software-Elektronik-Datentechnik  
Porphystrasse 15  
D-6905 Schriesheim  
Tel.: (06203) 6741  
Telex: 4 65 025 keil d

Schriesheim is near Heidelberg.

Toshio Shinjo \*  
Microboards, Inc.  
3-8-9 Baraki  
Ichikawa City, Chiba 272-01  
Japan  
Tel.: 0473(28)6005  
Telex: 2993122 MICRO J.

Ichikawa is just northeast of Tokyo.

These men are both Microware representatives and will serve as distribution agents for information we forward to them. Also, we hope to be kept abreast of the significant happenings and software developments in their areas. Dr. Keil indicated that there are probably 200-300 OS-9 users in Germany, but possibly eight times that in France. An estimate of about 300 users in the U.K. was made. (Please help us to update these estimates.)

In order to keep deliberations short, the choice of Dr. Keil and Mr. Shinjo was quite arbitrary and unilateral. A mechanism to choose such representatives more formally should be a part of next year's meeting agenda.

When software distribution details are pinned down, these contacts will be used to reach their constituencies. In addition, once we have the OS-9 BBS operating on an OS-9 machine, we will try to find an economical way of providing access to it by Tymnet or some similar service which may be useful for our members abroad. We will gladly consider establishing other contacts in countries or continents where the need is felt and where volunteers come forward.

#### Membership & Communications

The official mailing address of the OS-9 Users Group is as follows:

OS-9 Users Group  
P. O. Box 8027  
Des Moines, IA 50301

All mail sent to this address will be forwarded to the appropriate officer for action or consideration. Thus, a lag in response may be expected. It was decided, however, that a permanent address was necessary.

If you know another address of the person you wish to reach, you may certainly communicate directly. Please do not publish other addresses for the Group, however.

Membership in the Group may be obtained by sending a check payable to the OS-9 Users Group for \$25 to the above address.

#### CompuServe Special Interest Group Jim Bellomo

I have been in communication with the folks at CompuServe and they are enthusiastic but slow. I received descriptive information on OS-9 from Andy Ball at MicroWare and sent it out to CompuServe. They were impressed. At first they thought that Tandy had developed OS-9. GADS !!!!!!! Well, they 'now the history now.

Special Interest Groups on CompuServe function much as do bulletin boards which you may have used. The SIG can be set up to allow Users Group members only to download software. But I have some thoughts on this. The SIG will not cost any money to the OS-9 group. It will only cost the user the connect time (\$5.00 an hour from 6 PM to 5 AM and all day on weekends and holidays their local time.) The CPM SIG works this way: When one first checks on it asks if you would like to become a member. If you answer yes they will process your membership in about a week (there is no cost). Once you are established as a member you are allowed to download programs. If you are not a member you are allowed to view the messages and such things but not download files. There is good security. The user signs on CompuServe with an ID and a password. This information is logged to the SIG the user is on so there should be few problems with security. The people from CompuServe said it will take 6 to 8 weeks to get the SIG underway. That time has now passed, and we may see action this week (the first week of November).

If anyone feels that they have quite a bit of software to upload to the SIG and does not want to bear the cost then they can contact myself or an official of the group and we shall assist. This by no means is to replace the OS-9 users group or software exchange; it is meant to be an enhancement and to educate the nation to OS-9. I would appreciate any comments. I can be reached on the OS-9 BBS, CompuServe (ID 71625,240) or at home at 203-621-5925 8070).

P.S. The above is edited from Jim's message on the OS-9 BBS. When the OS-9 SIG has been put up, it will be noted in the CompuServe sign-on banner ... soon we hope. It will also be noted on the OS-MINE BBS and on the COCO CompuServe SIG.

Subscription to CompuServe cost only \$20 from Radio Shack. You get a free hour of access and a similar opportunity for the Dow-Jones News Service for the money.

#### CompuServe Numbers for Officers

Look for the officers on CompuServe using these:

Dale Puckett, Pres.	71446,736
Peter Dibble, V.P.	71426,423
George Dorner Tress	70536,106

We're just beginners at this, but activity should pick up soon.

You can also contact MicroWare via CompuServe EMAIL. Their number is 73105,1265. We will try to read mail and respond at least once a week. They will try to answer general inquiries and questions but can't handle detailed technical support (use the Hotline for this IF you are paid up) nor will communications of a commercial nature be carried on here.

#### Treasurer's Report

An account has been established for the OS-9 Users Group at St. Paul Federal Savings and Loan Association of Chicago. Funds from last year's treasurer, Terry Straehley, were transferred to this account after deposits from the MicroWare meeting in Des Moines. Here's a brief report:

	Debit	Deposit
Opening deposit (4 memberships)		\$ 100.00
Transfer T. Straehley		2173.92
Two memberships		50.00
MicroWare - P. O. Box	\$ 15.00	
Interest		
Balance as of 11/1/83		2.61
		\$2311.53

Submitted by George Dorner, Treasurer

#### Software Exchange

ATTENTION: Much of the software donated in Des Moines was not accompanied by the required paperwork. Signed forms (especially the "Public Domain" statement) are required before the software can be distributed.

#### OS-9 User Group Software Library as of 10/29/83

Title: ACIA.MAPIN By: DIBBLE, PETER  
Language: 6809 Format: SOURCE  
Brief Description: FILTER TO CHANGE CONTROL STRINGS FROM A TERMINAL INTO CORRESPONDING ANSI STRINGS.

Title: ACIA.MAPOUT By: DIBBLE, PETER  
Language: 6809 Format: SOURCE  
Brief Description: APPENDAGE FOR THE ACIA DRIVER; GETS CONTROL OF INIT, READ, AND WRITE AND PASSES THEM THRU ACIA TO THE PHYSICAL DEVICE.

Title: ANSI.GOTOKY By: DIBBLE, PETER  
Language: 6809 Format: SOURCE  
Brief Description: VIDEO TERMINAL DATA MODULE FOR ANSI-STANDARD TERM; FOR USE WITH "DYNASTAR" SCREEN EDITOR.

Title: ATTR\_CHG By: CULP, JERRY  
Language: BASIC09 Format: SOURCE  
Brief Description: "GROUP-CHANGE" OF ATTRIBUTES OF ALL FILES IN A SPECIFIED DIRECTORY.

Title: BINCOM By: KREIDER, C. R.  
Language: BASIC09 Format: SOURCE  
Brief Description: COMPARES TWO SPECIFIED FILES

Title: BLANKO By: CAPOUCH, BRIAN  
Language: BASIC09 Format: SOURCE  
Brief Description: BLANKS A COMPLEX DATA STRUCTURE TO NULLS

Title: BOOTSPPLIT By: KREIDER, C. R.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: SPLITS MERGED OBJECT FILES (SUCH AS "OS9BOOT") INTO SEPARATE MODULES.

Title: CHAR\_TO\_INT\_TO\_CHAR By: CAPOUCH, BRIAN  
 Language: BASIC09 Format: SOURCE  
 Brief Description: TWO PROCEDURES TO CONVERT BASIC09 STRINGS TO INTEGERS AND VICE-VERSA.

Title: CHECK\_FILE By: CAPOUCH, BRIAN  
 Language: BASIC09 Format: SOURCE  
 Brief Description: DETERMINES FILE STATUS OF SPECIFIED INPUT FILE.

Title: DATE\_CVT By: CAPOUCH, BRIAN  
 Language: BASIC09 Format: SOURCE  
 Brief Description: CONVERTS DATE BETWEEN TWO FORMATS: MM/DD/YY TO/FROM YYDDD (WHERE "DOD" IS THE JULIAN DAY OF YEAR FORM 1-365).

Title: DCOPY By: CAPOUCH, BRIAN  
 Language: BASIC09 Format: SOURCE  
 Brief Description: FULL DIRECTORY COPY UTILITY

Title: DDIR By: SEATON, W. G.  
 Language: 6809 Format: SOURCE  
 Brief Description: LISTS ACTIVE SYSTEM DEVICES, THEIR PATH DESCRIPTOR ADDRESS, PHYSICAL ADDRESS, SYSTEM BUFFER, DEVICE DRIVER & FILE MANAGER

Title: DLIST By: KREIDER, C. R.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: DISK DUMP UTILITY. WORKS LIKE "DUMP /DO#", EXCEPT YOU CAN START AT ANY SECTOR ON THE DISK.

Title: DOLIAR\_PRINT By: CAPOUCH, BRIAN  
 Language: BASIC09 Format: SOURCE  
 Brief Description: CONVERTS "REAL" AMOUNT (greater or equal to 999.99) TO "STRING" "DOLLAR" FORMAT.

Title: EQDFIX By: KREIDER, C. R.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: STRIPS COMMENTS, BLANK LINES, AND PSEUDO OPTS FROM EQUATE FILES

Title: ERREPORT By: CAPOUCH, BRIAN  
 Language: BASIC09 Format: SOURCE  
 Brief Description: PRINTS MESSAGE ON LINE 2 OF TERMINAL, WAITS FOR CNTL-F ACKNOWLEDGEMENT.

Title: FLEXBIN By: KALEITA, DAVID L.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: CONVERTS "FLEX-FORMAT" (COMPRESSED) BINARY FILES INTO FULL IMAGE (FULL SIZE, POSITION-DEPENDENT) BINARY FILES, READY TO "ROM".

Title: FORMS2.CNX By: MORSE, G.  
 Language: CIS COBOL Format: SOURCE  
 Brief Description: STRUCTURED AND MAINTAINABLE 100% REPLACEMENT FOR MICRO FOCDS FORMS2 PACKAGE. INCLUDES FILES FORMS2.CN1 & FORMS2.CN2

Title: GEINUMB By: MORSE, G.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: MORE POWERFUL VERSION OF THE BASIC09 "VAL" FUNCTION.

Title: HCOPY By: SNYDER, HAL, M.D.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: PROMPTING "COPY" UTILITY

Title: HDEL By: SNYDER, HAL, M.D.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: PROMPTING "DELETE" UTILITY

Title: HDIR By: CADMUS, RAY  
 Language: BASIC09 Format: SOURCE  
 Brief Description: HEIRARCHICAL "DIRECTORY" UTILITY

Title: HELP By: SEATON, W. G.  
 Language: 6809 Format: SOURCE  
 Brief Description: PRINTS USER INFORMATION ON THE SPECIFIED FILENAME.

Title: HX By: DIBBLE, PETER  
 Language: 6809 Format: SOURCE  
 Brief Description: CONVERTS STANDARD INPUT DATA TO READABLE HEX DUMP FORMAT OUTPUT.

Title: ILEAV By: KREIDER, C. R.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: PRINTS DISK INTERLEAVE TABLES

Title: INKEY\_HAL By: SNYDER, HAL, M.D.  
 Language: 6809 Format: SOURCE  
 Brief Description: READ INDIVIDUAL KEY DEPRESSIONS

Title: INSTALL By: KREIDER, C. R.  
 Language: 6809 Format: SOURCE  
 Brief Description: USED TO "LINK" A FILE CALLED "OS9BOOT" ON THE SPECIFIED DEVICE. THIS FILE MAY BE PLACED ON THE DEVICE USING A STANDARD "COPT"

Title: JERRYBENCH By: POUMELLE, JERRY / MORSE, G.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: 10x10 MATRIX MULTIPLY BENCHMARK

Title: KILL13 By: SNYDER, HAL, M.D.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: STRIPS ALL "S13" (X-OFF) CHARACTERS FROM A FILE.

Title: KIMTRON By: KALEITA, DAVID L.  
 Language: 6809 PROCEDURE Format: SOURCE & TEXT  
 Brief Description: SET OF FILES TO AID IN THE USE OF THE KIMTRON ABM85 TERMINAL WITH OS-9. STARTUP FILE WILL AUTO-PROGRAM FUNCT KEYS. DYNASTAR "COTOXY" MODULE FOR THIS TERMINAL IS ALSO INCLUDED.

Title: LIST By: MICROWARE SYSTEMS  
 Language: 6809 Format: OBJECT  
 Brief Description: LISTS A TEXT FILE AND PRINTS TITLE, PAGE NUMBER, AND DATE (WORKS LIKE THE NEW "PR" UTILITY BY MICROWARE).

Title: LISTH By: KREIDER, C. R.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: TRIVIAL PROGRAM TO LIST A TEXT FILE WITH EACH LINE PREFIXED BY A LINE NUMBER.

Title: LLOAD By: SNYDER, HAL, M.D.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: UPLOADS A TEXT FILE, ONE LINE AT A TIME, TO A FULL-DUPLEX BULLETIN BOARD SYSTEM.

Title: MODBUILD By: SNYDER, HAL, M.D.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: PROMPTING FILE "MERGE" UTILITY

Title: MODDEM By: MACLEAN, D.  
 Language: 6809 Format: SOURCE  
 Brief Description: COMMAND TO COPY CHARACTERS TO/FROM SPECIFIED DEVICE.

Title: MODLIST By: SNYDER, HAL, M.D.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: PROMPTING "IDENT" UTILITY

Title: MUSIC By: KALEITA, DAVID L.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: AUDIO RECORDING CATALOGING SYS

Title: NETWORK By: KREIDER, C. R.  
 Language: BASIC09 Format: SOURCE  
 Brief Description: ELECTRONIC CIRCUIT NETWORK DESIGN /ANALYSIS

Title: PRINT By: BIALON, LAURA  
 Language: BASIC09 Format: SOURCE  
 Brief Description: FILE PRINTING UTILITY- ADAPTED FROM X&P'S "SOFTWARE TOOLS"

Title: PRINT\_MW By: MICROWARE SYSTEMS  
Language: 6809 Format: OBJECT  
Brief Description: WILL TAB AN ASSEMBLER LISTING  
WITH PAGE NUMBER, TITLE, AND DATE.

Title: PWD By: DIBBLE, PETER  
Language: 6809 Format: SOURCE  
Brief Description: MORE POWERFUL VERSION OF MW'S  
"PWD" COMMAND

Title: PWD\_NAME By: CAPOUCH, BRIAN  
Language: BASIC09 Format: SOURCE  
Brief Description: DOES A "PWD" AND RETURNS THE  
RESULT (OUTPUT) AS A BASIC09-READABLE STRING  
VARIABLE.

Title: QDIR By: KREIDER, C. R.  
Language: BASIC09 Format: SOURCE  
Brief Description: PROMPTING VERSION OF THE NEW MW  
"D" COMMAND (MINUS THE OPTIONS). OUTPUTS A VERTICAL  
DIRECTORY LISTING.

Title: REHOOK By: SNYDER, HAL, M.D.  
Language: BASIC09 Format: SOURCE  
Brief Description: MOVES A FILE FROM ONE DIRECTORY  
TO ANOTHER (ON THE SAME DEVICE) WITHOUT  
"COPY/DELETE"

Title: REMOTE By: SEATON, W. G.  
Language: 6809 Format: SOURCE  
Brief Description: "LINKS" USER TO A SPECIFIED  
REMOTE TERMINAL PATH FOR COMMUNICATION.

Title: RESRAT1NC By: KREIDER, C. R.  
Language: BASIC09 Format: SOURCE  
Brief Description: PRINTS ALL 1% RESISTOR  
COMBINATIONS THAT FIT THE SPECIFIED RESISTOR RATIO  
AND ERROR (TOLERANCE) LIMITS.

Title: SIEVE By: MORSE, G.  
Language: BASIC09 Format: SOURCE  
Brief Description: SELF-TIMING BENCHMARK

Title: SQSH By: DIBBLE, PETER  
Language: 6809 Format: SOURCE  
Brief Description: "SQUASHES" TEXT FILES BY  
REPLACING EVERY CARRIAGE RETURN CHARACTER WITH A  
"/" AND EVERY STRING OF MORE THAN 1 SPACE WITH 1  
SPACE.

Title: STRIPNUM By: KALEITA, DAVID L.  
Language: BASIC09 Format: SOURCE  
Brief Description: STRIPS A SPECIFIED NUMBER OF  
CHARACTERS FROM THE BEGINNING OF EACH LINE IN A  
TEXT FILE; A NEW FILE IS CREATED AS THE OUTPUT.

Title: STRIPREM By: KALEITA, DAVID L.  
Language: BASIC09 Format: SOURCE  
Brief Description: STRIPS ALL "REM" STATEMENTS OUT  
OF THE SPECIFIED INPUT FILE (WHICH IS NOT  
MODIFIED); A NEW "PROCEDURE" IS CREATED AS OUTPUT.

Title: SYSCALL\_HAL By: SNYDER, HAL, M.D.  
Language: 6809 Format: SOURCE  
Brief Description: EXECUTE AN OS-9 SYSTEM CALL FROM  
BASIC09

Title: TERM\_CNTL By: CAPOUCH, BRIAN  
Language: BASIC09 Format: SOURCE  
Brief Description: PERFORMS SPECIAL TERMINAL  
CONTROL SEQUENCES.

Title: TECOM By: KREIDER, C. R.  
Language: BASIC09 Format: SOURCE  
Brief Description: COMPARE TWO TEXT FILES A LINE AT  
A TIME.

Title: TRANSLIT By: BIALON, LAURA  
Language: BASIC09 Format: SOURCE  
Brief Description: (ADAPTED FROM K&P "SOFTWARE  
TOOLS")

Title: WORDS By: DIBBLE, PETER  
Language: 6809 Format: SOURCE  
Brief Description: PARSES INPUT INTO WORDS AND  
OUTPUTS EACH WORD ON A SEPARATE LINE.

#### Late Notice

The CompuServe SIG went public December 1. It  
is on Page PCS-18. A guide to using the OS-9  
Special Interest Group (SIG) software on CompuServe  
has been prepared and is available at no charge  
from the OS-9 Users Group. To receive a copy of  
the guide, send a self-addressed, stamped envelope  
with sufficient postage to cover return mailing  
costs (two units of first class postage) to:

OS-9 Users Group  
P. O. Box 8027  
Des Moines, IA 50301

Application for Membership OS-9 Users Group

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone Number \_\_\_\_\_

We sometime make our membership list available  
to groups we believe our members might be in-  
terested in. Please check here if you do not  
want to be included in the list we distribute:  
()

Check Type of OS-9:  
Level One() Level Two() 68000()

Hardware manufacturer \_\_\_\_\_

Floppy Disk size 5<sup>1</sup>/<sub>2</sub>"() 8<sup>1</sup>/<sub>2</sub>"() Other()

\*\*\*\*\* Send this application with a check or  
or money order for \$25 to:

OS-9 Users Group  
P. O. Box 8027  
Des Moines, IA 50301

## 68000 SAGE SYSTEM

Dear Don,

This letter has been in the works for a long time, but Ron Anderson's column in the February issue finally got me off my duff and set me to work.

Like Ron, I too was very dismayed at the 68000 offerings available on the S-10 bus. Then I started extending the horizon a little. I had been thinking about supplementing my faithful, venerated, but ancient 1975 SWTP mainframe with something a little more reliable. After looking over the ads in 68 Micro and thinking about what was really useful to me, I started looking in BYTE. Suddenly people like Jerry Pournelle were talking about a new 68000 machine called the SAGE, and it looked good. A little more investigation at the SAGE Computer Technology branch office in Boston proved that the machine was real and did what it claimed to do. I was impressed enough to buy one, and after 9 months I have no regrets at all.

The SAGE II is barely larger than the two half-height floppies on its front panel, but size is a deceptive measure of computer power. Inside the box is an 8 MHz 68000 that runs flat-out with no wait states ever. It runs BYTE's Sept. 82 benchmark in 4.2 seconds in native code Pascal and 1.12 seconds in raw machine code. The single system board has sockets for 512K of DRAM, two serial ports, a parallel printer port, an IEEE-488 port and a disk controller that runs two 640K byte octo-density 5-1/4 inch floppies. The NEC floppy controller allows me to configure either of the drives in a different disk format to read IBM or Flex disks. If you have more than 128K of RAM, you get a built-in RAMdisk as well.

The system comes bundled with a real Pascal and with an extremely fast MCS-9900 p-system operating system. When I bought the machine it also included the p-system BASIC and FORTRAN. (The new releases have substituted a text editor and spreadsheet.) A single additional disk supplied me with macro cross-assemblers for the 6800, 6803, 6502, 8080, 8085, Z-8, Z-80, 8086, 9900 and LSI-11. In the p-system, when the assembler or compiler detects an error it pops you right into the editor with the cursor pointing to the place in the source code where it got upset. A few seconds and you've fixed the error and are re-assembling. I'd seen this take several minutes on the Apple p-system, but on the SAGE it happens in seconds, even with 30 page source programs. I was able to teach myself Pascal with the same interactivity that BASIC provides. Now I'm experimenting with Wirth's new Modula II language which has all the good parts of Ada without the faults.

What does all this cost, you may ask? The surprising answer is that the SAGE II with 512K of RAM and with the MCS-9900 Pascal, P-system, text editor and spreadsheet costs quite a bit less than just the hardware of a dual disk GIMIX 6809 machine with 128K - less the software. My total investment with Modula, CPM/68K and the cross-assemblers was under \$4500. And does the SAGE have any other software? Well, SAGE recently put out a half inch thick book that lists over 70 major offerings including FORTH, APL, C, the IDMS and CPM/68K operating systems and lots of business software. Plus there is a Pascal users library with a lot of public domain stuff. Unfortunately, the offering does not yet include Uniflex. When I talked to TSC, they were hoping that SAGE would hire them to write it. They might be a lot better off doing it on their own. SAGE has plenty of software vendors, but TSC has only done Uniflex 68K for the ExidyMACs at this time.

And what about hardware expansion? For the die-hards who have to get at the bus and are willing to leave the lid off the box, there is an internal bus (two 50 pin ribbon connectors) that allows SAGE to add their expansion board with four more UARTs, a hard disk controller, and another 512K of RAM. The hobbyist can use this system bus for hardware hacking. Complete system schematics, ROM listings and system documentation (4 fat books worth) are supplied with the machine.

Do I miss the S-50 bus? Perhaps you might ask if I miss the dirty Molex connectors and the fried power supply diodes from mis-locating boards in the wee morning hours. Actually, I can run the hardware in my SWTP by sending data through the serial port from the SAGE, and I still use the SWTP for Stylograph. It may seem like heresy, but I don't feel that the S-50 bus is adequate or appropriate for the 68000. An 8-bit 68008 implementation seems like a waste of a good processor. I think the S-50 bus was a fine innovation in the year 1975 and is an adequate 8-bit bus for the 80's, but this fixation on a single bus by 68 Micro Journal seems a bit illogical. Come on guys and open up the eyeballs. Are we to miss hearing about SAGE and McIntosh because they aren't S-50? Please, Dan, if you're going to put a 68000 on the cover of your magazine, try to include some information about real 68000 systems on the inside.

Sincerely yours,  
 Richard H. Lord  
 Bennett Rd.  
 Durham, NH 03824  
 (603) 659-2721

Richard, thank you for the letter concerning your SAGE 68000 computer. We are looking for 68K material! However, I would appreciate it if you could go a little more into detail on the SAGE. You know, like most of the articles that appear in 68 Micro Journal.. Not necessarily a comparison article, apples and oranges you know, but what the system does and how well (or how NOT so well). Also ease of use, price and quality of software, documentation, availability of hardware and software and all the other info that most newcomers to the 68000 would want to know.

Your letter covered enough subjects to fill many a page that our readers would surely want to read. Also just some "GENERAL" information on the 68000 and the 68008 would be appreciated. We all (staff here) find that there is not enough input on the 68000 from our readers to justify a full 68000 effort, at this time. However, with input from satisfied users like yourself we could fill many pages with real useful 68K material and thousands of readers would thank you and all that contribute. Also we expect to see many more 68000 CPU cards and other accessories advertised in 68 Micro Journal in the future. I suspect that shortly we will see 68000 systems from SWTPC, GIMIX, SSB and others as well as HELIX and LSI who are delivering 68000 CPU cards for existing systems now. Also we hear things from MICROWARE (68000 OS-9) and TSC (68000 Uniflex) but having seen nothing can't comment.

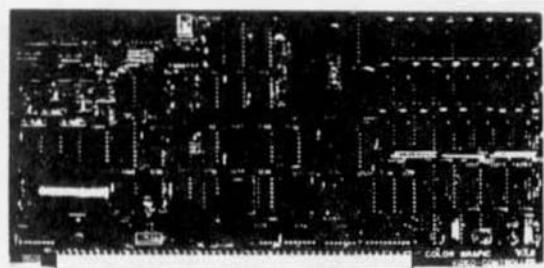
As to "Operating Systems" it seems that UNIX® and CPM 68K® are the ones who will dominate the 68000 market unless some of the other OS writers get on the stick! Reputation (?) is one thing delivery is

another, what is needed in the 68000 community right now is delivery of good software that does not expect the end-user to debug it for its creator. We have had too much of that in the past. Fact is that we have had more than one prospective software buyer call us asking about "horror" stories heard about some 68000/6809 software and operating systems. Nowadays it is going to require hardware and software ready to run, and RUN PROPERLY. Bugs and stupid omissions will not be tolerated by todays users. The past is gone and to make it this time around, it better work right the FIRST time!!!!!! Software version number 36 or some such high number, or hardware with wire and piggyback IC sockets won't cut it. Believe me those days are past, forever! Thanks again Richard, please let me know if you feel that you could contribute something suggested above. We are not "rock bound" to the Standard S50 Bus, and we certainly need to keep abreast of all other systems that our readers are interested in. Apparently many if not most have some interest in one or the other variants of the 68000, and we will certainly cover the 68000 in more depth as time passes. It seems that the popularity of a system is only as high as is the availability of "APPLICATIONS" software for said system. The 68000 community has not shown me much to date. Looking forward to your reply and trusting you will find time to share your 68000 experiences with the thousands of our readers. DMW

Dipl. Ing. Jürgen Knauf  
 SOFTWARE HARDWARE DIGITALELECTRONIC



## COLOR GRAPHICS DISPLAY CONTROLLER



Universal multimode color and black & white video controller with 512 x 512 data high-resolution, EF9365 LSI-graphics display processor chip (1024 x 512 dot-version will be released later).

- BASIC FEATURES Version 1 rev. 2
  - 512 x 512 x 3 data planes (16 bit) or 512 x 256 data planes (interlaced or serial order) display
  - 162 Kbytes character memory or 2 character planes. The character planes are individually addressable. 16 Kbytes of character memory are available for each plane.
  - EF9365-640 LSI graphic display processor high speed vector per second, bullet to animation rate up to 7,500,000 dots/s. All planes can be written simultaneously.
  - 3 memory modes of address (16 bit address)
    - colored display with 8 bit color, 256 colors
    - B/W display with 8 level luminance
    - 8 x 8 matrix display of 3 memory modes (8 x 8 characters)
  - Full ASCII character generator (88 x 16) and lower case characters. programmable scaling factor in the range of 1-16 times the basic format of 8 x 16 pixels (= character zoom). independent 16 programmable horizontal and vertical zoom factors, normal and horizontal/vertical/tilt characters, special symbols, max alphanumeric screen format 88 x 80.
  - All memory operations are done during raster cycle - this is why we have always a better pixel density.
  - Memory mode selection through on-chip programming in I/O or FIFO memory selectables on following occurrences: command ready, ignore sequence ended, vertical retrace, ignore switch active.
  - 3-7 screen memory refreshings for easy drop control, auto coordinate address advance - address registers points to end of vector for start of next character after writing a character.

- 12 bit expanded memory registers provided for access around blocks under normal conditions
- Parallel/serial interface modules designed for both check and print applications
- Graphics and 48 x 64 characters for 80 column word processor
- IEEE 50 C bus board (dimensions: 3.5" x 12") bus to the most popular and fastest systems
- Address translators 16 or 256 bit address range
- 32 bit address translator, fully decoded and mapped directly to three memory mapped expanders to 64 registers
- 1 or 2 MHz operation
- Vertical frame 50 Hz refresh
- Power requirement: 8 V up to 1 A
- Outputs: RGB/NTSC, TTL, level by logic selectable, composite video, SVIDEO, 1 and composite by 8 in 4 outputs

#### ADDITIONAL FEATURES OF VERSION 2

- Color control lines for 8 of 6080 colors
- One additional graphics plane register for hardware linking feature with different line table highlighting
- Read-modify-write hardware: allows non-destructive reading of one or more consecutive characters or any character over the screen under software control
- 16 bit logical memory access for operation of each data structure
- Complete input selection of internal or external video, high resolution by software makes it possible to work with only one monitor for standard and graphic display
- Screen memory: maximum on a 2000x600 pixel basis
- Model 3: support 8.0 x 1600 simultaneous memory of 3 planes/1600 on screen changing of 2 planes can be modified separately. Hence this model provides for simple bidimensional CAD applications
- Universal interface for standard monitors: RGB, CGA, CGA with Reg. TTL, bid to 15 V, 2.4 VDC or 1 VDC driving etc.

Comments about the new version 2:  
 1) The 2000x600 resolution and the screen, which makes it possible to work with only one monitor for standard and graphic display.  
 2) The addition of assembly language, BASIC, PASCAL, FORTRAN 77 for easy program writing.  
 Source code on FLEXDISK

#### ADDITIONAL HARDWARE

- Super high speed interface with 50 msec. access, TTL signal output and keyboard switch
- Sensors and logic connection to interface and the system board for keyboard, mouse, and other peripheral products for either 64 or 128 characters per line support, switched power supply
- Bus adapters for special microprocessors (8086, 8088, 8089)
- Special adapters for COMMODORE and APPLE II, extra cards with DILIG-16, DILIG-18 and DILIG-16

#### SOFTWARE

Software written around the FLEXDISK memory of the system, but memory support on 6000 memory and one standard PASCAL memory of 6000 characters

Further features: monitor control for 80-1960, CGA, CGA 80x25, 6000 characters  
 Please refer to data sheet for more information

#### ADDITIONAL OPERATOR

The controller uses the interface technique to refresh the screen (same principle like the ordinary TV set). Therefore it is possible that on standard monitors a slight flickering is visible.

To avoid this effect it is recommended to use a monitor with long persistence screen.

To prevent interference effects on the screen between the 50 or 60 Hz line frequency and the controllers 50 Hz refresh rate, it is recommended to use monitors with a switched mode power supply.

The file header is written to the disk after each addition or deletion of a key making the files nearly crash-proof. No damage will result if a diskette is removed when no update of the file is taking place.

The price of the BLS/81\_Trees package is \$80. The price of an update for licensed BLS users is \$10. OEM licenses available for application developers.

Yours Truly,

*D. K. K.*

Paul Kehler  
 Clearbrook Software Group Inc.

## CLEARBROOK SOFTWARE GROUP INC.

System Design, Support, Analysis

February 6, 1984

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 SOFTWARE GROUP INC.  
 BOX 1000, SUITE 200  
 SUMAS, WA 98295  
 PHONE: (360) 653-9118

Clearbrook B.C.  
 Canada  
 (604) 851-9118

#### D\_JDISK UTILITIES PATCHES

##### Clear B\_JDISK Utilities Patch:

Some bugs have been found in revision 1 and 2 of the D\_JDISK utilities. In revision 1 and 2 of DDir, DAttr, DDel and DCopy if the last entry in a directory is another directory, you may get an end of file error (211). In revision 1 programs, you cannot use numbers in a wildcard file specification. You can check which revision you have by using the D69 LOAD command:

DDir: At offset hex 167 from the beginning of the module change hex 41 to hex 30. At offset hex 307 from the beginning of the module change hex FF to 00. At offset 353 from the beginning of the module you should have hex 10 3F 00. Change this and following code to hex 34 20 0A 03 20 C1.

DAttr: At offset hex 145 from the beginning of the module change hex 41 to hex 30. At offset hex 326 from the beginning of the module you should have 10 3F 00. Change this to 34 20 0A 03 20 C1.

DDel: At offset hex 380 from the beginning of the module change hex 41 to hex 30. At offset hex 38C from the beginning of the module you should have 10 3F 00. Change this to 34 20 0A 04 20 C1.

DCopy: At offset hex 164 from the beginning of the module change hex 41 to hex 30. At offset hex 30C from the beginning of the module you should have 10 3F 00. Change this to 34 20 0A 04 20 C1.

For revision 2 programs use the following patches:

DDir: At offset 343 from the beginning of the module you should see 10 3F 00. Change this to 34 20 0A 03 20 C1.

DDel: At offset 337 from the beginning of the module you should see 10 3F 00. Change this to 34 20 0A 03 20 C1.

DAttr: At offset 34C from the beginning of the module you should see 10 3F 00. Change this to 34 20 0A 04 20 C1.

DCopy: At offset 328 from the beginning of the module you should see 10 3F 00. Change this to 34 20 0A 04 20 C1.

A Sample Patching Session for DDir revision 1.

**D69:DEBUG**  
 Interactive Debugger  
**DB: \$load ddir**

**DB: 1 ddir**  
**E000 87**

**DB: ..+147**

**E147 41**

**DB: #30**

**E148 24**

**DB: 1 ddir**

**E000 87**

**DB: ..+307**

**E307 FF**

**DB: #0**

**E308 FF**

**DB: 1 ddir**

**E000 87**

**DB: ..+353**

**E353 10**

**DB: #34**

**E354 3P**

**DB: #20**

**E355 88**

**DB: #0a**

**E356 1P**

**DB: #03**

**E357 23**

## CLEARBROOK SOFTWARE GROUP INC.

System Design, Support, Analysis

February 6, 1984

#### News Release

An update is now available to all licensed users of BLS. This update is in the form of a companion utility called BLS\_Trees. BLS\_Trees will maintain a B-tree index on disk and allow versatile access to the keys. It offers several advantages over BLS in that it uses B-tree instead of binary tree indexing. This means increased speed and automatic balancing of the tree.

#### Features and Limitations of BLS\_Trees:

Language.....	6809 machine
Language interface.....	Basic09, C
Maximum key length.....	121 characters
Node size.....	256 characters
Maximum keys per file.....	65,000
Key order.....	ASCII, uppercase, ASCII, numeric, library

Typical timing for a file with 8 character keys on 5 1/4" 80 SD floppy disk.

Time to add 1000 keys to empty index.....1.67 seconds  
 Time to find and delete 300 keys from file with 3000 keys.....1 sec/key  
 Typical time to find key in file with 3000 keys.....1.3 sec

DB: =20  
DB: =cl  
DB: q

059:DIR .

make sure it works

059: DEL /d0/ ends /d1/

059:SAVE ddirx ddir

069:VERIFY <ddirx>/d0/ands/ddir u

You now have a good copy. Good luck!

Truly Yours,

Exhibit 11

Paul Kehler  
Clearbrook Software Group, Inc.

# BUDGET

By: Jeffrey Craig  
Apple Valley Dr.  
Menomonee Falls, WI 53051

BUDGET allows one to enter items and dollar amounts allotted per item on a monthly basis. The program will first cue the operator for the number of items he wishes to keep track of, the specific items, and the dollar amounts the operator wishes to budget. Since the program operates within the confines of a 24 line by 80 character display, about 16 items can be viewed on the terminal. For more than 16 items to be viewed hardcopy should be produced. Once the item files have been created at the first session, they will be loaded at subsequent budgetary analysis sessions automatically. Files can then be kept on a daily basis, the operator being cued for the daily amount spent on each particular item. The daily file can be listed to the terminal or the printer. A budgetary analysis of daily files within a particular month can then be carried out. In addition to the dollar amounts allotted, the totals spent, the percent of the amount allotted, and the difference is displayed. Hence the operator has an idea which items he is keeping within budget and those he is overspending as well as the overall effect of his spending.

```

1740 PRINT #0, TAB(22); "AMOUNT SPENT ON :100"
1750 PRINT #0, "ITEM"
1760 IF FL=0 THEN GOTO 1830
1780 PRINT #0, TAB(20); "ALLOTTED"
1790 PRINT #0, TAB(36); "SPENT"
1800 PRINT #0, TAB(47); "REMAINING"
1810 PRINT #0, TAB(60); "PERCENT"
1810 GOTO 1640
1830 PRINT #0, TAB(36); "SPENT"
1840 PRINT #0
1850 IF FL=0 THEN GOTO 1760
1860 FOR X=1 TO 11
1870 PRINT #0, S(X)
1880 PRINT #0, USING '$9999.99', TAB(20); S(X)
1890 PRINT #0, USING '$9999.99', TAB(34); S(X)
1900 IF S(X)=X THEN GOTO 1930
1910 PRINT #0, USING '$9999.99', TAB(47); S(X)-X
1920 GOTO 1940
1930 PRINT #0, USING '$9999.99', TAB(47); S(X)-X
1940 IF S(X)=0 THEN PRINT #0, TAB(63); "-" ; GOTO 1760
1950 PRINT #0, USING '$9999.99', TAB(60); S(X)-X
1960 NEXT X
1970 GOTO 2020
1980 FOR X=1 TO 11
1990 PRINT #0, S(X)
2000 PRINT #0, USING '$9999.99', TAB(34); S(X)
2010 NEXT X
2020 PRINT #0, "-----"
2030 LET M=0
2040 LET R=0
2050 LET N=0
2060 FOR A=1 TO 11
2070 M=M+1(X)
2080 R=R+S(X)
2090 M=M-N(X)
2100 NEXT X
2110 PRINT #0, "TOTAL"
2120 IF FL=0 THEN GOTO 2160
2130 PRINT #0, USING '$9999.99', TAB(20); R
2140 PRINT #0, USING '$9999.99', TAB(34); N
2150 GOTO 2180
2160 PRINT #0, USING '$9999.99', TAB(34); N
2170 GOTO 2240
2180 IF R=N=0 THEN GOTO 2210
2190 PRINT #0, USING '$9999.99', TAB(47); R-N
2200 GOTO 2220
2210 PRINT #0, USING '$9999.99', TAB(47); R-N
2220 IF R=0 THEN PRINT #0, TAB(93); "-" ; GOTO 2240
2230 PRINT #0, USING '$9999.99', TAB(60); M*100/R
2240 PRINT #0
2250 IF F="Y" THEN CLOSE 0
2260 RETURN
2270 IF ERR=8 THEN RESUME 1450
2280 PRINT " FILE NOT FOUND"
2290 RESUME 1540
2300 CLOSE 1
2310 LET N=7
2320 GOSUB 2420
2330 IF ERR=8 THEN PRINT "DISC FILE :28: NOT FOUND"
2340 RESUME 590
2350 LET N=7
2360 GOSUB 2420
2370 PRINT " -> NAME OF THE FILES WERE FOUND :"
2380 GOTO 590
2390 GOSUB 2420
2400 END
2410 REM SCREE 10 120 CLEAR SCREEN AND HOME CURSOR
2420 POKE PO-HEX("18")
2430 POKE PO-HEX("28")
2440 FOR I=1 TO 2
2450 POKE PO-HEX("00")
2460 NEXT I
2470 IF U#0 THEN GOTO 2510
2480 FOR I=1 TO N
2490 PRINT
2500 NEXT I
2510 LET U=-99
2520 LET N=12
2530 RETURN

```

by Joe Turner

Computer Systems Center  
 13461 Olive Blvd.  
 Chesterfield, MO 63017  
 (314) 576-5020

In working with modern disassemblers, such as our DYNAMITE, it is easy to lose sight of the fact that some of the fancy software being disassembled was probably (you never know for sure) written with the aid of macros. Be on the lookout for repetitive blocks of code, and replace them with macros, and your source file will shrink and at the same time become more readable.

One example of where macros could be put to good use is in disassembling TSC's BASIC and XBASIC interpreters, which use a special code to represent keywords. (Does anybody know why they do that?) Replacing the hundreds of FCB's generated

by the disassembler with macro calls will make the strings much easier to read and (if you're really brave) add to and/or modify.

I have turned on the 'EXP' option to show the macros expanded. Normally you turn off this option after you are sure that the macros work the way you want them to work.

The example given here is admittedly crude. If you know of a more elegant way of doing the same thing with the TSC 6809 Macro Assembler, please let me know.

This is just one more example of the fact that, even with the best disassembler software package, some creative thought is required of the human disassembler.

```

MACRO . Call it whatever you like.
IFC  &1,1 IF first parameter is '1',
FCB  '&2*2-26 then assemble this.
ENDIF

IFC  &1,2 and so on...
FCB  '&2*2-26
FCB  '&3*2-26
ENDIF

IFC  &1,3
FCB  '&2*2-26
FCB  '&3*2-26
FCB  '&4*2-26
ENDIF

IFC  &1,4
FCB  '&2*2-26
FCB  '&3*2-26
FCB  '&4*2-26
FCB  '&5*2-26
ENDIF

IFC  &1,5
FCB  '&2*2-26
FCB  '&3*2-26
FCB  '&4*2-26
FCB  '&5*2-26
FCB  '&6*2-26
ENDIF

IFC  &1,6
FCB  '&2*2-26
FCB  '&3*2-26
FCB  '&4*2-26
FCB  '&5*2-26
FCB  '&6*2-26
FCB  '&7*2-26
ENDIF

IFC  &1,7
FCB  '&2*2-26
FCB  '&3*2-26
FCB  '&4*2-26
FCB  '&5*2-26
FCB  '&6*2-26
FCB  '&7*2-26
FCB  '&8*2-26
ENDIF

IFC  &1,8 Do some error trapping.
ERR  STRING ENCODE ERROR (ENC 8)
ENDIF

```

IFC 61,9  
 ERR STRING ENCODE ERROR (ENC 9)  
 ENDIF  
 IFC 61,10  
 ERR STRING ENCODE ERROR (ENC 10)  
 ENDIF

ENDM

\* Test cases:

0000	ENC ?;A,B	Show number of characters.
0000 60	FCB 'A02-26	
0001 60	FCB 'B02-26	
0002	ENC 3;T,A,B	Separate characters with commas.
0002 60	FCB 'T02-26	
0003 60	FCB 'A02-26	
0004 60	FCB 'B02-26	
0005	ENC 4;S,T,Q,P and so on...	
0005 60	FCB 'S02-26	
0006 60	FCB 'T02-26	
0007 60	FCB 'Q02-26	
0008 60	FCB 'P02-26	
0009	ENC 5;C,V,T,4,S	
0009 60	FCB 'C02-26	
0010 60	FCB 'V02-26	
0011 60	FCB 'T02-26	
0012 60	FCB '402-26	
0013 60	FCB 'S02-26	
0014	ENC 7;C,D,A,P,I,L,E	
0014 60	FCB 'C02-26	
0015 60	FCB 'D02-26	
0016 60	FCB 'A02-26	
0017 60	FCB 'P02-26	
0018 60	FCB 'I02-26	
0019 60	FCB 'L02-26	
0020 60	FCB 'E02-26	
0021 60	FCB 'S02-26	
0022	ENC 8;A,B,C,D,E,F,G,H too long	
*** STRING ENCODE ERROR (ENC 8)	ENDM	
	END	

**ESI Electronic Specialists, Inc.**  
 171 South Main Street, Natick, Mass. 01760  
 (617) 655-1537

NEW PRODUCT RELEASE

FOR IMMEDIATE RELEASE

FOR MORE INFORMATION: FRANK STIFTER

REMOTE SWITCHED ISOLATORS

Remotely Switched ISOLATORS announced by ELECTRONIC SPECIALISTS are the newest addition to their popular patented ISOLATOR filter/suppressor line of interference control products. Available on all ISOLATOR models, the remote AC power control switch can be mounted near the equipment operator for convenience and system cable neatness.

Micro Computer applications include laboratory, hospital, industrial and personal systems having a need to conveniently control power to the operating system from a central location.

Total Remote Switched ISOLATOR load capacity is 1875 watts MAX, with each socket capable of handling a 1 KV load. Remote switching available on models ranging from single-filtered models to quad-filtered magnum models. Prices start at \$79.95.

ELECTRONIC SPECIALISTS, INC., 171 South Main Street  
 Natick, Massachusetts 01760 Phone: (617) 655-1532

FACT SHEET

SOUTH FLORIDA COMPUTER GROUP

	Ft. Lauderdale Section	Miami Section
1. Name	South Florida Computer Group - Ft. Lauderdale Section	South Florida Computer Group - Miami Section
2. Mailing Addr	P.O. Box 690 Hollywood, FL 33022	240 N.W. 203 Terrace Miami, FL 33169
3. Meeting Loc	Social Annex, Holiday Park-Ft. Lauderdale	Pamericaneu Cancer Research Center, 1155 NW 14 St. Miami, FL
4. When	Second Monday of each Month at 8 PM	Third Tuesday of each Month at 8 PM
5. Publications	I/O Newsletter	I/O Newsletter
6. Contact	Bob Haslins, Secretary	Jerry Lofatagod, Secretary
7. Telephone	305-922-0095	305-533-0469
8. Dues/Subs	Open to the public, free of charge. \$8 per year for membership and newsletter	Open to the public, free of charge. \$8 per year for membership and newsletter
9. Social Interests	General club, User groups meet at 7 PM before each general meeting. All microprocessors represented.	General club, User groups meet at 7 PM before each general meeting. All microprocessors represented.

GENERAL INFORMATION

Meeting Programs May Consist of:

1. Discussion and presentations of new Personal Computer products
2. Film presentations on the basics of computer programming and computer operations.
3. Presentations by Manufacturers of Personal Computer products.
4. Demonstrations of Personal Computers owned by various members.
5. Discussions on the progress of various club projects.
6. User-group discussions of various Personal Computing Systems such as 8000, 8000, Z-80, TRS-80, PET, APPLE, DIGITAL (COMPUTER), and others.
7. Forums on BASIC and other programming languages.
8. Dissemination of information regarding upcoming events.

Dear Sirs:

Mr. Gary McConville, in a letter appearing in the September, 1981 issue of your magazine reviewed the combination of the Epson ME-80 printer and the Epson 814 Serial board. If Mr. McConville will set up the board for 2800 baud and then use the statement = POKE 199.10 (or the machine language equivalent) at the beginning of every program, he will achieve the full 80 characters per second that the ME-80 is capable of.

I have recently added Electra disk interface to my Color computer system and have started using it again. The interface installs very easily and since I have the disk drives off of my old Model 1 computer system it was very economical.

Supplied with the interface is 32K of memory and a disk operating system. The memory map for the computer is changed so that user accessible memory is the first 16K inside the computer with the first 16K inside the interface giving a total of about 28K. When taking into account the memory used by the color computer including RAM, ROM and text and graphic screens, with the BASIC's being in the bottom 16K, BASIC's address space is shared with the other 16K. This means that you can't use RAM from \$C000 to \$CFF0 or \$0000 to \$0EFF0 by \$C000. The whole \$0000 loads into RAM from the diskette on powerup and from then on until you power down you can put just a formatted cassette in drive 0 and not have to have a system diskette in a drive at all. By a simple POKE you can free up the space used by the monitor. I'm not certain that this space is useable from BASIC in any other way than POKEing it but I suspect that it is not.

The disk commands exceed part of BASIC and it is not necessary for the user to leave the BASIC environment at all. All of the usual disk operating commands are available and include the following:

LOADBK - Prepare a blank disk for use (FORMAT)  
 CAT - Get a directory of the diskette.  
 BACKUP - Copy the full diskette.  
 COPY - Copy an individual file from one diskette to another.  
 RENAME - Rename a file.  
 KILL - Delete a file from the diskette.  
 MERGE - Append a program to the program in memory.  
 VERIFY - Double check all disk operations.  
 PAST - Set the track-to-track stepping rate of a disk drive.  
 SAVE - Save a BASIC program.  
 SAVER - Save a machine language program.  
 SAVEA - Save a BASIC program in ASCII format.  
 RUN - Load and execute a BASIC program.  
 LOAD - Load a BASIC program into memory.  
 LOADR - Load a machine language program into memory.  
 LOADS - Load a ROM basic into memory.  
 LOADT - Load a TEC I BASIC file into memory.  
 OPENDP - Random access file open.  
 CLOSE - File close.  
 FIELD - Organize a random file buffer.  
 LSET - Set data into buffer.  
 RSET - Put data into buffer.  
 MKNO - Convert number to disk storable state.

CVN - Convert disk storable string to number.  
 PUTB - Write buffer to disk file.  
 GETB - Read disk file to buffer.  
 LOB - Length of file.  
 EOF - End of file.  
 LOC - Position within a file.

Sequential I/O works the same as the tape I/O except that the device number changes.

If you have piggy-backed additional memory into your Color Computer, you will lose the additional 16K you put in, but the 32K in the interface makes up for this.

By going through a fairly involved procedure, you may save ROM packs off to disk and load and execute them if you know the beginning, execution and ending addresses. The programs have to be relocated, since the ROM packs use memory at \$C000 and so does the DOS. Fortunately the removable code from all of the packs I have tried so far is easily relocatable.

The procedure is to use an optional cable from Exatron which connects into the expansion slot on the Color Computer with the ROM pack you want to save in place of the cable. Using tape I/O you backup the ROM onto tape and then unplug the ROM pack cable and plug in the disk drive interface. After booting into the system you load the ROM pack saves off of the cassette into memory where you want it to execute and then save it to disk as a binary file. Executing is a simple matter of load and execute.

The functions provided by the on board monitor are as follows:

\*A\* - display contents of memory in hex and ASCII.  
 \*B\* - set breakpoint.  
 \*D\* - display memory in hex.  
 \*E\* - Do a memory location and execute.  
 \*L\* - load C64OS from disk into memory.  
 \*M\* - readify address.  
 \*O\* - save memory block to address 14 memory.  
 \*P\* - test all of RAM (includes user and DOS RAM) - very good tests.  
 \*R\* - saves a constant into a block of memory. Used for clearing memory, etc.  
 \*S\* - exit and return to BASIC.

While this is not quite the best monitor available by any means, it certainly is the handiest since it is always there.

The only real complaint I have about the system relates to the cable from the interface to the computer. This is a ribbon cable with a male connector on the ends. Exatron would do well to consider putting a case on the cable such as found on the ROM packs. As it is, it is a bit difficult for those with thin thumbs (such as myself) to plug it in. The same complaint holds true for the ROM backup adapter.

Don't take the above complaint too seriously. All and all, I'm tickled pink with the interface. The documentation is certainly adequate for one who has upgraded from a Model I to a Color Computer, even if it is the temporary manual.

Knowing Exatron from past experience, I would say that their final manual will be great even for the beginner.

Probably the vast majority of Color Computer owners will buy Radio Shacks disk expansion rather than Exatron, but anyone, like me, who is moving up from the Model I to the Color Computer will want to make sure that at least their BASIC programs will be able to be transferred into the Color Computer. With Exatron you can do this.

Thank you for providing your magazine as a forum for CC owners. Even at this late date in the Color Computers life, there is not much information available for this machine and every bit helps.

Exatron is located at 101 Commercial Street, Sunnyside, CA., 96068. They have a toll free number for order entry. It is 1-800-538-0559.

*John Clark*  
 The Computer Store, Inc.  
 6501 South Peoria Avenue  
 Tulsa, Oklahoma 74105

PG: Sorry about the copy on computer paper, but it was all I had.

- b, file - no restraint on printing,  
 473 - *John Clark*

## SUPPORT YOUR ADVERTISERS



SPELL 'N FIX II NOW FREE  
 800 PRODUCT RELEASE - FEBRUARY 8, 1984

In releasing their brand new SPELL 'N FIX II proofreader program, Star-Kits Software Systems Corporation announced today that the program will be sent at no charge to anyone who sends Star-Kits a blank disk and a self-addressed stamped disk mailer. The program as well as all documentation will be on the disk, and users may print their own manual from the disk.

In announcing the plan, Star-Kits' president Peter Stark also indicated that SPELL 'N FIX II users will be encouraged to provide free copies to friends. The program is accompanied by a request that satisfied users make their own estimate of the program's worth to them, and then send a proportionate contribution to Star-Kits to encourage the further development of such programs.

# Keep your PC sane

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Star-Kits indicated that SPELL 'N FIX II had already been advertised at a price of \$49.75, and was superior to many proofreading programs selling for \$200-300 for other computers. He said that the decision to provide SPELL 'N FIX II free was a difficult one, but that it was a better alternative than strong copy protection. Star-Kits had recently developed an almost break-proof copy protection algorithm, but felt that it would impose too much of a burden on legitimate purchasers. He said, "Based on our experience with the original SPELL 'N FIX, we're convinced that many Color owners will get copies of the new SPELL 'N FIX in a relatively short time. We're sure they will love it, and only hope that enough of them will actually send us a contribution."

More information on SPELL 'N FIX II may be obtained from Star-Kits Software Systems Corporation, P. O. Box 209, Mt. Kisco NY 10549, or by calling (914) 241-0287.

### STAR-DOS LEVEL I

NEW PRODUCT RELEASE - February 6, 1984

Star-Kits Software Systems Corp. today announced the release of STAR-DOS Level I, a single-user disk operating system for 6809-based computer systems.

The Level I release is a successor to the STAR-DOS which has been available for over a year on the Radio Shack Color Computer. But the Level I version has been rewritten for use on the larger 6809 systems which are popular in industrial, control, and advanced hobbyist applications. This includes SS-50 systems and single-board computers from a variety of vendors.

The modularity of STAR-DOS allows easy interfacing to a variety of hardware, including up to ten floppy or Winchester drives. It has been specially configured to be compatible with current software; almost all 6809 programs written for linked-chain disk operating systems (such as Technical Systems Consultants' Flex) will run under STAR-DOS without modification. This includes a variety of language compilers and interpreters, editors and assemblers, word processing programs, financial programs, and debugging packages. Programs which work with STAR-DOS are available from STAR-KITS and dozens of other sources.

STAR-DOS Level I is available both for individual purchase and for licensing to equipment manufacturers. The end-user price in single quantities is \$75, which includes an extensive programmer's manual with sample programs and utilities.

More information on STAR-DOS Level I may be obtained from Star-Kits Software Systems Corporation, P. O. Box 209, Mt. Kisco NY 10549, or by calling (914) 241-0287.

### COMPILER EVALUATION SERVICES

By: Ron Anderson

The S.E. MEDIA Division of Computer Publishing Inc.  
Is offering the following "SUBSCRIBER SERVICE":

#### COMPILER COMPARISON AND EVALUATION REPORT

Due to the constant and rapid updating and enhancement of numerous compilers, and the different utility, appeal, speed, level of communication, memory usage, etc., of different compilers, the following services are now being offered with periodic updates.

This service, with updates, will allow you who are wary or confused by the various claims of compiler vendors, an opportunity to review comparisons, comments, benchmarks, etc., concerning the many different compilers on the market, for the 6809 microcomputer. Thus the savings could far offset the small cost of this service.

Many have purchased compilers and then discovered that the particular compiler purchased either is not the most efficient for their purposes or does not contain features necessary for their application. Thus the added expense of purchasing additional compiler(s) or not being able to fully utilize the advantages of high level language compilers becomes too expensive.

The following COMPILERS are reviewed initially, more will be reviewed, compared and benchmarked as they become available to the author:

PASCAL "C" GSPL WHIMISCAL PL/9

Initial Subscription - \$39.95  
(Includes 1 year updates)  
Updates for 1 year - \$14.50

S.E. MEDIA - CPI  
5900 Cassandra Smith, P.O. Box 794  
Hixson, TN 37343  
615 842-4601

Dear Don,

Thanks for the colorful letter reminding me that I needed to write this note. Please find enclosed my check for another year's subscription to 68 Micro.

I was reading 68 Micro for about 6 months before I got my Color Computer, and now with DS9 and real languages running on it. I find 68 Micro to be the only true source of valid technical information for DS9 and the 6809 in general. I look forward to staying in the fold.

Thanks for the good job that you're doing and keep up the good work!

Mike Michnovitz  
504 B Ortiz S.E.  
Albuquerque, NM  
87108

### CLASSIFIED ADVERTISING

LIKE NEW - ADDOS-VIEWPOINT CRT TERMINALS - DEMO UNITS, THESE ARE LIKE NEW - WARRANTY NEVER REGISTERED - SAVE - ONLY \$478.00 EACH - ONLY 1 LEFT. CALL ASK FOR DON, TOM or LARRY

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"Complete SWTP 6809 system, 2-5 1/4" disks, 56K RAM, 80 x 24 video, keyboard, 12" monitor, NEC 8023A printer, MP-R, clock-timer, software, manuals. \$1495.00. Curt Barrett (301) 577-2105

GIMIX #28 51/4 Disk Controller, Never Used with GIMIX FLEX \$150; SWTPC 8K Memory Board \$35; SWTPC 32K Universal Memory Board (unpopulated) Never Used \$50; Call 805-968-7688 (after 6 PM) CRAIG or Leave Tape Message; 221 Hillview Drive, Goleta, CA 93117; Reasonable offers considered.

64K Radio-Shack Color Computer, upper/lower case, Disk controller, 2 disk drives w/cable. DATA-COMP version FLEX9, FMATE(RS), TPS6809, TABULA RASA, XBASIC, others. \$1,000. Printer available. Garrett 214-722-0043.

### STAR-DOS LEVEL I

Whenever a new DOS is introduced, there's always the problem of developing software to work with it. So we did it the opposite way — we analyzed the requirements of software that already exists and developed a DOS that met them... and exceeded them! The result is STAR-DOS Level I, a new DOS for 6809 systems, ideal for single-user industrial, control, and advanced hobbyist applications. This includes SS-50 systems and single-board computers from a variety of vendors.

Level I is compatible with most current 6809 hardware and software. On the hardware side, it allows up to ten floppy or Winchester drives with appropriate controllers. On the software side, it runs existing 6809 software from all the major 6809 software suppliers, including TSC, Star-Kits, Introl, and others.

Write or call for more information. STAR-KITS Software Systems Corporation. P.O. Box 209, Mt. Kisco N.Y. 10549 (914) 241-0287.



# GOOD NEWS!



## C for the 6809 WAS NEVER BETTER!

### INTROL-C/6809, Version 1.5

Introl's highly acclaimed 6809 C compilers and cross-compilers are now more powerful than ever!

We've incorporated a totally new 6809 Relocating Assembler, Linker and Loader. Initializer support has been added, leaving only bitfield-type structure members and doubles lacking from a 100% full K&R implementation. The Runtime Library has been expanded and the Library Manager is even more versatile and convenient to use. Best of all, compiled code is just as compact and fast-executing as ever - and even a bit more so! A compatible macro assembler, as well as source for the full Runtime Library, are available as extra-cost options.

Resident Introl-C/6809 compilers running under Flex or OS9 are priced from \$375; Uniflex, from \$425.

Cross-compilers for PDP-11/Unix hosts are priced from \$1500.

#### Trademarks:

Introl-C, Introl Corporation;  
Flex and Uniflex, Technical Systems Consultants;  
OS9, Microware Systems;  
PDP-11, Digital Equipment Corp.;  
Unix, Bell Labs.

For further information, please call or write.

**INTROL**  
CORPORATION

647 W. Virginia St.  
Milwaukee, WI 53204  
(414) 276-2937

# OS/9, FLEX, COCO, UNIFLEX SOFTWARE

## SUPER SLEUTH DISASSEMBLER EACH \$99-FLEX, \$101-OS/9, \$100-UNIFLEX

Interactively generates source on disk with labels, includes xref, label definition, binary file editing, etc.  
Specify 680x/6502 version or Z-80/8080/85 version

## (OBJECT ONLY) EACH \$50-FLEX & OS/9, \$49-COCO DOS

COCO DOS available in 680x/6502 version only

## CROSS-ASSEMBLERS EACH \$50-FLEX, \$55-OS/9, \$60-UNIFLEX, ALL \$100

Specify for 6800/1, 6502, 6805, Z-80, or 8080/48/85

OS/9 version requires Microware RMA or FHL OSM macro assembler

FLEX version requires TSC ASMB or FHL ASM or OSM macro assembler

## DEBUGGING SIMULATORS EACH \$75-FLEX, \$100-OS/9, \$80-UNIFLEX

Specify for 6800/1, 6805/148805, or 6502

## OS/9 AND UNIFLEX SIMULATORS EACH \$100-FLEX

Debug OS/9 and UNIFLEX application programs under FLEX using TSC DEBUG facility

## 6502 TO 6809 ASSEMBLER TRANSLATOR \$75-FLEX, \$85-OS/9, \$80-UNIFLEX

Translates 6502 programs to 6809, noting inexact conversions

## 6800 TO 6809 & 6809 PIC TRANSLATORS \$50-FLEX, \$75-OS/9, \$60-UNIFLEX

Translates 6800 programs to 6809, 6809 programs to PIC

## FULL-SCREEN FLEX AND UNIFLEX TSC XBASIC PROGRAMS FOR 6809

(with complete cursor control)

DISPLAY GENERATOR/DOCUMENTOR \$50-FLEX, \$75-UNIFLEX

MAILING LIST SYSTEM \$100-FLEX, \$110-UNIFLEX

INVENTORY WITH MRP \$100-FLEX, \$110-UNIFLEX

TABULA RASA SPREADSHEET \$100-FLEX, \$120-UNIFLEX

## DISK UTILITY PROGRAM LIBRARY \$50-FLEX

Edit disk sectors, sort directory, maintain master catalog, etc.

## C MODEM TELECOMMUNICATIONS PROGRAM \$50-FLEX & OS/9 & UNIFLEX

Provides menu-driven telecommunications facilities, with terminal mode, up/down load, MODEM7 protocol, etc.

## 5.25" SOFT-SECTORED DISKETTES EACH SET OF 50 \$75

With Tyvek jackets, hub rings, labels, write-protect tabs, CSC guarantees DSDD

Specify operating system, computer make and type, terminal type  
Programs provided in source form on diskette; specify size and density  
Contact CSC for full catalog and dealer info; printed manuals provided with products  
For VISA and MASTER CARD, give account, exp. date, phone, US funds only  
Add 5% for shipping software, but not for diskettes  
(UNIFLEX trademark Technical Systems Consultants OS/9 trademark Microware

Computer Systems Consultants, Inc.  
1454 Latta Lane, Conyers, GA 30207  
Telephone Number 404-483-1717/4570

# SOFTWARE FOR THE HARDCORE

\*\* FORTH PROGRAMMING TOOLS from the 68XX&X \*\*  
\*\* FORTH specialists — get the best!! \*\*

NOW AVAILABLE — A variety of rom and disk FORTH systems to run on and/or do TARGET COMPILE for 6800, 6301/6801, 6809, 68000, 8080, Z80

Write or call for information on a special system to fit your requirement.

Standard systems available for these hardware—

EPSON HX-20 rom system and target compiler  
6809 rom systems for SS-50, EXORCISER, STD, ETC.  
COLOR COMPUTER  
6800/6809 FLEX or EXORCISER disk systems.  
68000 rom based systems  
68000 CP/M-68K disk systems. MODEL II/12/16

iFORTH is a refined version of FORTH Interest Group standard FORTH, faster than FIG-FORTH. FORTH is both a compiler and an interpreter. It executes orders of magnitudes faster than interpretive BASIC. MORE IMPORTANT, CODE DEVELOPMENT AND TESTING is much, much faster than compiled languages such as PASCAL and C. If Software DEVELOPMENT COSTS are an important concern for you, you need FORTH!

firmFORTH™ is for the programmer who needs to squeeze the most into roms. It is a professional programmer's tool for compact rommable code for controller applications.

\*\* iFORTH and firmFORTH are trademarks of Talbot Microsystems  
\*\* FLEX is a trademark of Technical Systems Consultants, Inc.  
\*\* CP/M-68K is trademark of Digital Research, Inc.

iFORTH™  
from TALBOT MICROSYSTEMS  
NEW SYSTEMS FOR  
6301/6801, 6809, and 68000

### ...> iFORTH SYSTEMS <...

For all FLEX systems: GIMIX, SWTP, SSB, or EXORcisor Specify 5 or 8 inch diskette, hardware type, and 6800 or 6809.

\*\* iFORTH — extended fig FORTH (1 disk) \$100 (\$15)  
with fig line editor.

\*\* iFORTH+ — more! (3 5" or 2 8" disks) \$250 (\$25)  
adds screen editor, assembler, extended data types, utilities,  
games, and debugging aids.

\*\* TRS-80 COLORFORTH — available from The Micro Works  
\*\* firm FORTH — 6809 only. \$350 (\$10)

For target compilations to rommable code.  
Automatically deletes unused code. Includes HOST system source and target nucleus source. No royalty on target files. Requires but does not include iFORTH+.

\*\* FORTH PROGRAMMING AIDS — elaborate decompiler \$150

\*\* iFORTH for HX-20, in 16K roms for expansion unit or replace BASIC \$170

\*\* iFORTH 68K for CP/M-68K 8" disk system \$290  
Makes Model 16 a super software development system.

\*\* Nautilus Systems Cross Compiler

— Requires: iFORTH+ HOST+ at least one TARGET  
— HOST system code (6809 or 68000) \$200  
— TARGET source code: 6800-\$200, 6301/6801—\$200  
same plus HX-20 extensions— \$300

6809—\$300, 8080/Z80—\$200, 68000—\$350

Manuals available separately — price in ( ).  
Add \$6 system for shipping, \$15 for foreign air.

TALBOT MICROSYSTEMS 1927 Curtis Ave., Redondo Beach, CA 90278 (213) 376 9941

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**CoCo OS-9" FLEX"**  
**SOFTWARE**

### ASSEMBLERS

TSC

Macro Assembler  
the FLEX STANDARD Assembler

F, CCP \$59.00

Relocating Assembler w/Linking Loader  
Use with many of the C and Pascal Compilers.

F, CCP \$159.00

Great Plains Comp. Co.

REMAC  
Relocating, Recursive Macro Assembler  
and Linking Loader for the 6809

Supports Recursive Macros, Conditional Assembly, etc. Optional X-Ref Listing. Includes a Small Line-oriented Editor as part of the Assembler.

F, CCP \$159.00

F, CCP w/Source \$269.00

OmegaSoft

FRAMA

Relocating Assembler and Linking Loader  
2-pass Relocating Assembler; 2-pass Linking Loader. Supports 6 Char. Labels, System Calls (SWI[x] PCB x), Expressions with Arith., logic, and Shifts, etc.

F, CCP \$125.00

One Year Maint. \$59.00

Mindrush Micro Systems

MACE

By Graham Trott. A combined Editor and Assembler designed to allow the Programmer to Enter, Edit, and Assemble Programs with a minimum of effort, w/o leaving the Program. Designed primarily for small to medium sized Program Development. Includes XTRACE, a Cross Assembler for the MC6800/1/3 and Hitachi HD6381 (MOS 6801).

F, CCP - \$98.00

### DISASSEMBLERS

Computer System Consultants

SUPER SLEUTH

Computer System Consultants Super Sleuth is a "Time Tested", reliable, PROVEN Disassembler that has gained acceptance through out the 88-58 Bus Community as an extremely POWERFUL, INTERACTIVE, Software Tool. The Super Sleuth Software Package consists of 3 Programs: SLEUTH (the Disassembler), SLEUTH (used to globally Change Labels to a meaningful Name), and XREF (a Cross Reference Generator for Source Code Files). SLEUTH will Disassemble Memory Resident 6809 Code and 6800, 6801, 6802, 6803 (the "Baby CoCo"), 6805, 6808, 6809, and 6502 (Apple, Atari, Commodore, etc.) Binary Disk Files. (See Aug. '83 '88 Micro Journal "Color Users Notes" Column for a full review.)

Color Computer 68-58 Bus (all w/ Sources)

CCD (32k Req'd)

Obj. Only \$49.00

F, \$99.00

CCF, Obj. Only \$59.00

U, \$109.00

CCF, w/Source \$99.00

O, \$181.00

CCD, Obj. Only \$59.00



\*FLEX is a trademark of Technical Systems Consultants  
\*OS9 is a trademark of Microware

All Computer Systems Consultants Software

runs on the Color FLEX Systems

All in stock

call 800-338-6800

for IMMEDIATE DELIVERY

### Computer Systems Center

#### OS9ASM +

An "easy to use", powerful Disassembler for Disk Resident 6809 and 6800 Binary Files. Allows the development of a "Control File" of various Program "Boundaries" during successive disassemblies; can use a Label File which automatically replaces a Hex location with a Label Name; includes an XREF Utility; etc. Label Files provided for Mini-FLEX, FLEX2, FLEX9, Color Computer (for use with Color FLEX Systems), etc. OS-9 Version includes special OS-9 options.

CCP, Obj. Only	\$169.00
CCD, "	\$159.00
F, "	\$169.00
O, "	\$159.00
U, "	\$269.00

### COMPILERS & DECOMPILE

#### 6809 "Structured" Assembly Lang. Compilers

##### Mindrush Micro Systems

#### PL/9

By Graham Trott. A "Structured" Assembly Language Editor/Compiler/Debugger, all in ONE PROGRAM, provides a totally INTERACTIVE Program Development Cycle. The Compiler supports large Symbol Names, Variable Types, Pointers, Control Structures, Stack, A-, B-, and D-Register manipulation, etc. The Source-Ordered Trace/Debugger provides Single Stepping, Breakpointing, etc. An excellent Software Development Tool for utilizing the power of the 6809 in developing small to medium sized packages.

F, CCP - \$198.00

##### Whimsical Developments

#### WIDECOM

Need the Ease of Design and Maintainability of "Structured Programming" AND the Speed and Control of Assembly Language? Then WIDECOM was designed for you! This Single Pass, Recursive Descent Compiler provides the tool for developing simple Utilities to MAJOR Systems in Assembly Language. Supports 3 "Lex" Levels which allow one level of Procedure nesting, or more within "Modules". It is easy to develop programs written for other machines since you are working at the Assembly Language level. Features unified, user-defined I/O; produces relocatable, relocatable, recursive, re-entrant Code; Structured style and statements with Procedures and Modules; supports Byte and Double-Byte primitives with 3 types of Integers (up to 32 bit), Char and Boolean, and unlimited sized Arrays (vectors only); Interrupt handling; unlimited length Variable Names; Variable Initialization (defaults to \$00); Include "Source File" directive; Conditional compiling; direct Code insertion; control of the Stack Pointer; etc. To quote Ron Anderson in his review of WIDECOM in the Sept. '83 Issue of '88 Micro Journal that, except for the lack of floats, "..., I have to give this one VERY high rating, ...". It is a FAST Compiler which produces FAST Code (his "Primes" Benchmark ran at 9 msec. on a 4 MHz System).

F and CCP - \$195.00

#### C Compilers

##### Mindrush Micro Systems

#### C Compiler

By James McCosh. Full featured C Compiler for the FLEX Operating System. Includes a Reloc. Asmb., but needs the TSC Relocating Assembler/Linking Loader (which includes a Library Manager) for those "full blown" System Packages.

F and CCP - \$295.00

##### Intral

#### C Compiler

A full-featured C, streamlined for the 6809. Generates very efficient object code. Output "Benchmarks" close to 100k 68000 in 8 Bit Operations; 1.5 times faster than a 4 MHz 286 when using a 240 6809 System (Re. p 43, '88 Micro Journal, May '83). Floats, etc.

F, CCP, and O - \$375.00  
U - \$425.00

One Year Maint. - \$100.00

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**CoCo OS-9" FLEX"**  
**SOFTWARE**

#### Availability Legend

F = FLEX, CCP = Color Computer FLEX

O = OS-9, CCD = Color Computer OS-9

U = UniFLEX

CCD = Color Computer Disk

CCT = Color Computer Tape



#### Southeast Media

##### CHET-TRAC Forecaster

CHET-TRAC Forecaster is an X-BASIC program that plans a diet in terms of either calories and percentage of carbohydrates, proteins and fats (C P G) or grams of carbohydrate. Protein and fat food exchanges of each of the six basic food groups (vegetable, bread, meat, skim milk, fruit and fat) for a specific individual.

Sex, Age, Height, Present Weight, Frame Size, Activity Level and Basal Metabolic Rate for married individual are taken into account. Ideal weight and sustaining calories for any weight of the above individual are calculated. When a weight goal is given (either gain or loss), and a calorie plan is agreed upon between the computer and the individual, the number of days to reach the weight goal is projected. The starting and ending rate of weight loss is calculated, and a daily calendar with each day's weight for a 30-day period is printed.

F - \$59.95

U - \$69.95

#### Southeast Media

##### UNIFLEX

A COMMUNICATION Package for the UNIFLEX Operating System

Allows UNIFLEX Based Systems to Transmit and Receive files to and from other Computer Systems via Modem. Use with CP/M, Main Frames, other UNIFLEX Systems, etc.

- Verifies Transmission integrity using checksum or CRC
- Automatically Re-Transmits bad blocks
- Transmits data in 128 byte blocks

U - \$299.95

#### Southeast Media

##### JUST

Text Formatter

JUST, a Text Formatter developed by Ron Anderson, provides numerous features which make it a valuable addition to any FLEX Users Software Library. JUST is designed for formatting Text Output for Dot Matrix Printers and provides many unique features:

- Output the "Formatted" Text to the Display for format analysis and change.
- Output the "Formatted" Text to a Text File for use with the supplied PRINTER.COM for producing multiple copies of the Text on the Printer INCLUDING IMBEDDED PRINTER COMMANDS (this Utility is very useful at other times also, and worth the price of the program by itself).
- User Configurable for adapting to other Printers (comes set up for Epson MX-80 with Craftrax); provides for up to ten (10) imbedded "Printer Control Commands", such as Italic on and off, boldface on and off, etc.
- Automatic compensation for a "Double Width" printed line.
- Includes the normal line width, margin, indent, paragraph, space, vertical skip lines, page length, page numbering, centering, fill, justification, etc.
- Use with ANY Editor.
- Supplied with "Structured Source" (Mindbrush PL/9); easy to see the flow of the program.

F and CCP - \$49.95

#### Souadata

##### PARM. UTILITIES

Requires SOUTHEAST Pascal ver 3.

XREF -- produce a Cross Reference listing of any text; oriented to Pascal Source.

F and CCP - \$25.00

INCLUDE -- allows the inclusion of other files in a Source Text; has unlimited nesting capabilities. Also allows Binary File inclusions.

F and CCP - \$25.00

PROVIDER -- produces an Indented, Numbered, "Structogram" of a Pascal Source Text file. Allows viewing the overall structure of large programs, and provides clues as to the integrity of the program. Supplied as Source Code; requires compilation.

F and CCP - \$25.00

#### Souadata

##### COPYCAT

Pascal NOT required

Allows reading TSC Mini-FLEX, SSB DDX68, and Digital Research CP/M Disks while operating under FLEX 1.0, FLEX 2.0, or FLEX 9.0 with 6800 or 6809 Systems. COPYCAT will not perform Miracles, but, between the program and the manual, you stand a good chance of accomplishing a transfer. Includes Utilities to list Directories, Copy Files, and convert Text Files when required. Also includes a Utility for investigating Physical Compatibility problems. Programs supplied in Modular Source Code (Assembly Language) to make it easier to solve unusual problems.

F and CCP 5" - \$58.00

F 8" - \$65.00

#### Computer Systems Consultants

##### FLEX DISK UTILITIES

Eighteen (18) different FLEX Utilities that should be a part of every FLEX Users Toolbox. Ten BASIC Programs to:

Compare, Merge, or Generate Updates between two BASIC Programs; check BASIC Sequence Numbers; compare two unsequenced files; and 5 Programs for establishing a Master Directory of several disks, and sorting, selecting, updating, and printing paginated listings of these files.

The other 8 Programs provide .COM files which allow: Copy a File with CRC errors, so it can possibly be salvaged; Test Disk for errors; Compare two Disks; a fast Disk Backup Program; Edit Disk Sectors; Mirrors error-chain on the Disk; print Disk Identification; and Sort and Replace the Disk Directory (in sorted order). All Utilities include source (either BASIC or Source Code). An EXCELLENT Value!

F and CCP - \$58.00

#### BUSINESS

##### WORD PROCESSORS

#### Alford and Associates

##### SCRIBITOR III

EXTREMELY Powerful Screen-Oriented Editor/Word Processor. Almost 50 different commands; EXCELLENT Documentation (over 300 pages), including a full Tutorial Section to help you learn how to use the system. Features Cursor-based editing, Dynamic Screen Formatting (what you see is what you get), Multi-Column display and editing, "decimal align" columns (AND add them up automatically, if wanted), define multiple keystroke macros, even and odd page number headers and footers, imbed printer control codes in text, full justification series of commands, full "help" support, store common command series on disk for future use, etc. Easy "Set-Up" (for example, you just hit the key you want to use for a specific function, such as "cursor up", and the System reads an stores that key - no digging into tech manuals for codes, etc.); we supplied "set-ups", or map the keyboard to what you are used too. Except for proportional printing, this package will DO IT ALL!

6800 or 6809 FLEX or SSB DDX, OS-9 - \$175.00

#### Great Plains Computer Co.

##### STYLICARD

A full-screen oriented WORD PROCESSOR — (now runs on the Data-Comp and PHL Color FLEX Systems; uses the 51 x 24 Display Screens). Full screen display and editing (i.e., what you see is what you get); supports the Daisy Wheel proportional printers.

SPECIAL CCP - \$195.00

F and D - \$295.00

U - \$395.00



"FLEX is a trademark of Technical Systems Consultants  
OS9 is a trademark of Microware

#### Availability Legend

F = FLEX, CCP = Color Computer FLEX  
D = OS-9, CCO = Color Computer OS-9  
U = UNIFLEX  
DD = Color Computer Disk  
CC = Color Computer Tape

**Great Plains Computer Co.****MAIL MERGE**

Greatly extends the power and flexibility of **STYLICRAFT**. Allows multiple Text files to be printed out as one large document. Provides for merging information into the Text File during printing (such as different names and addresses), etc.

F, CCP, O - \$145.00  
U - \$195.00

**Southeast Media****SPELLS "Computer Dictionary"**

OVER 125,000 words!

No more "let your fingers do the walking through the Dictionary" while you are entering Text with your favorite Editor or Word Processor. **SPELLS** is more than just "another Spelling Checker"; it allows you to look up a word from within your Editor or Word Processor so that you **KNOW** it is right **WHEN YOU TYPE IT IN** with the **SPH.CMD** Utility (which operates in the **FLEX** Utility Space). Yes, it **ALSO** allows you to check and update the Text after you are finished; along with allowing you to **ADD WORDS** to the Dictionary, "Flag" questionable words in the Text for evaluation later, "View a word in context" before changing or ignoring, etc. **SPELLS** first checks a "Common Word Dictionary", then the normal Dictionary, then a "Personal Word List", and finally, any "Special Word List" you may have specified. **SPELLS** also allows the use of **Small Disk Storage Systems**.

F and CCP - \$129.95

**Great Plains Computer Co.****SPELL**

Point Computer Dictionary -- allows directly changing the Text File, adding words to the dictionary, etc. 75,000 words in less than 400 sectors.

F, CCP, O/S/9 - \$125.00  
U - \$175.00

**DATA BASE MANAGEMENT SYSTEMS****Worchester Applied Business Systems****XDBS**

Possibly one of the most powerful Database Management Systems' available, this machine language program is small enough to operate on a single sided 5" disk, yet provides the speed of M.L. and power limited only by the user's imagination. This DBS supports Relational, Sequential, Hierarchical, and Random Access File Structures, and has Virtual Memory capabilities for those Giant Data Bases. **XDBS Level I** provides a functional "entity level" System which provides for defining a Data Base, entering and changing the Data, and producing Reports. **XDBS Level II** adds the POWERFUL "GENERATE" facility which uses an English Language Command Structure in manipulating the Data to create new File Structures, Sort, Select, Calculate, etc. **XDBS Level III** adds several special "Utilities" which provide additional ease of working with the various structures, changing System Parameters, etc.

XDBS Level I - F & CCP - \$129.95  
XDBS Level II - F & CCP - \$199.95  
XDBS Level III - F & CCP - \$269.95  
XDBS System Manual only - \$24.95

**Great Plains Computer Co.****DRIVING DBMS**

An XBASIC, Menu Driven, DBMS with "Built-In" Audit Tracking, Extremely Powerful Report & Format Capabilities, etc. This Time Proven DBMS will become the "Work Horse" of your Software Stable.

F and CCP \$295.00  
U \$395.00

**ACCOUNTING PACKAGES****Great Plains Computer Co.****Accounting Packages**

**Accts Rec., Accts Payable & Gen Ledger** -- A FULL Accounting Package that can be used together, or as separate packages; provides the IRS required Audit Tracking. (XBASIC, based on the "Osborne Business Programs")

F and CCP - ea. Program \$295.00  
U - ea. Program \$395.00



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"OS9 is a trademark of Microware

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**CoCo OS-9" FLEX"**  
**SOFTWARE**

**Universal Data Research, Inc.****Accounting and Database Prog. Sys.**

Note: ALL UDRI Accounting and DBM Progs. Require **PLUX** and **XBASIC**. These are Time Tested programs from an old, established, software house.

**Color Computer PLUX Systems**

DBM Part 1 - \$49.95	DBM Part 2 - \$49.95
Church Contributions - \$49.95	
Single Entry Gen Ledger - \$49.95	
Balanced Billing System - \$49.95	
A/R \$99.95	A/P \$99.95
	Gen Ledger \$189.00
Inventory 2 \$69.00	Payroll \$99.95

**PLUX and UNIFLEX** -- Note: Requires **XBASIC** or **basic**

A/P	F - \$295.00	U - \$395.00
A/R	F - \$295.00	U - \$395.00
Gen Ledger	F - \$295.00	U - \$395.00
Inventory 2	F - \$295.00	U - \$395.00
Payroll	F - \$295.00	U - \$395.00
DBM	F - \$350.00	U - \$450.00

**Computer Systems Consultants****FULL SCREEN INVENTORY/MRP**

The Full Screen Inventory System provides a means of maintaining small inventories. Using a linked, keyed random file structure based upon the item field, it keeps the file in alphabetical order for easier Inquiry. With the **PNID** command, the user may locate and/or print all records matching on partial or complete item description, vendor, or attributes. Items in backorder or below minimum stock levels may be located and/or printed thru the same process. Printed output may be produced in item or vendor order. A materials requirement planning (MRP) capability for manufacturing environments is included to allow the maintenance and analysis of hierarchical assemblies of items in the inventory file. It requires **TSC's Extended BASIC**.

F and CCP - \$169.00, U - \$150.00

**BUSINESS FORECASTING****The Virginia Company****Bizpack**

**BIZPACK** is used for storing accounting, numeric, and financial data which can then be used for planning, budgeting, forecasting, analyzing, etc. While "Electronic Spreadsheets" are extremely useful in many situations, **BIZPACK** excels in businesses where there are numerous expense columns, revenue sources, significant business indicators, large numbers, erratic week-to-week and month-to-month fluctuations, etc. **BIZPACK** helps determine statistical relationships, establish trend lines, "smooth" data via moving averages, analyze seasonal data, adjusts for inflation, logs data in Statistics or Column functions, plots data, etc. **BIZPACK** is oriented toward time series analysis of business. The Program displays information on the screen in Columns of Information with each Row conforming to a defined Period of Time (weeks, months, years, etc.), and is very easy to use (data is easy to enter, change, and modify; commands can be renamed to suit the user requirements; unlimited ability to create specialized commands using common BASIC statements; etc.). Requires **TSC's Extended BASIC**.

F and CCP - \$135.00  
with Source - \$250.00

**TOLL FREE**  
**1-800-338-6800**  
for Ordering



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**Hixson, TN 37343**  
info (615) 842-4601

**CoCo OS-9" FLEX"**  
**SOFTWARE**

**Availability Legends —**

F = FLEX, CCP = Color Computer FLEX  
O = OS-9, CSD = Color Computer OS-9  
U = UNIFLEX  
CDD = Color Computer Disk  
CCT = Color Computer Tape

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**CoCo OS-9™ FLEX™**  
**SOFTWARE**

**\*\*\* SPECIAL \*\*\***  
Purchase XBASIC and XEPACK together for \$221.50  
— a Savings of \$13.50 —

**Computer System Consultants**

**TABULA RASA SPREADSHEET**

TABULA RASA is similar to DESKTOP/PLAN and provides for the generation and maintenance of tabular computation schemes often used for analysis of business, sales, and economic scenarios. Its menu-driven user interface provides these capabilities even to those users with no programming experience. Its extensive report-generation capabilities allow the user to generate professional results with minimum effort. It requires TEC's Extended BASIC.

F and CCP - \$250.00, U - \$250.00

**Computer Systems Center**

**OBRA/C**

The Electronic Spread Sheet for 6809 Computer Systems. An extremely POWERFUL Business Tool, this Program will find an unlimited number of "non-business" applications, also (for example, a Full Junior College Electronics Curriculum was set up using OBRA/C). Advanced features like "Table (lookup)" make Income Tax work easy; Column or Row Sorting for numerous applications; etc. Completely "Memory Resident", Machine Language, this Program is FAST. Provides STANDARD FLEX Text File output for use with BASIC, Word Processors, Pascal, "C", etc. Also available for Data-Corp and FHL FLEX systems using the 50 x 24 Displays.

F and SPECIAL CCP - \$200.00  
U - \$395.00

**ODDS & ENDS**

**Computer System Consultants**

**FULL SCREEN FORMS DISPLAY**

This package supports any Serial Terminal with cursor control of Memory-Mapped Video Displays. The package substantially extends the screen input/output capabilities of TEC's Extended BASIC programs by providing a simple, table-driven method of describing and using full screen displays. These table entries are easy to set up and maintain, and are normally stored on disk and read as required. A simple, interactive means of generating the forms and the data field definitions is provided.

F and CCP - \$50.00, U - \$75.00

**Computer System Consultants**

**FULL SCREEN MAILING LIST**

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Software is the "backbone" for the REAL utilization of any Computer System, and ours are no exception! This has been no simple decision. While we realize that there could be some conflict with some of our advertisers, we ALSO hear a LOUD and CONTINUOUS cry for HELP from our Readers. From day one, the foremost concern of '68' **MICRO JOURNAL** has been it's READERS! Therefore, our **Southeast Media Division** will accept, for appraisal for possible Distribution, 6809 software; Games, Utilities, Software Development, Business Application Programs, etc.



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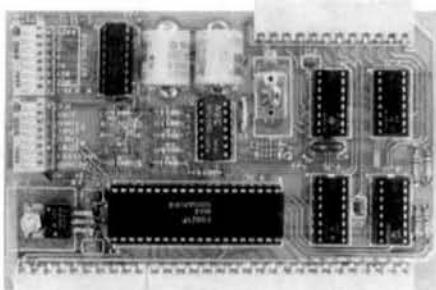
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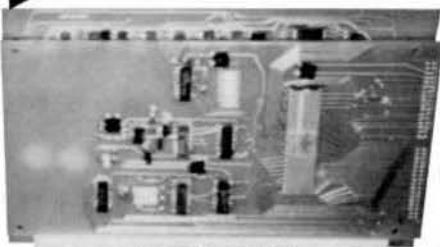
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2516	●	●	●	●	●	●	●
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2532	●	●	●	●	●	●	●
2732	●	●	●	●	●	●	●
2732A	●	●	●	●	●	●	●
2564	●	●	●	●	●	●	●
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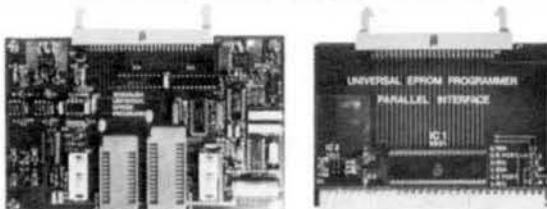
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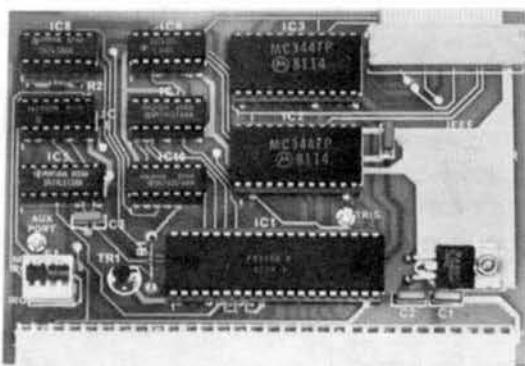
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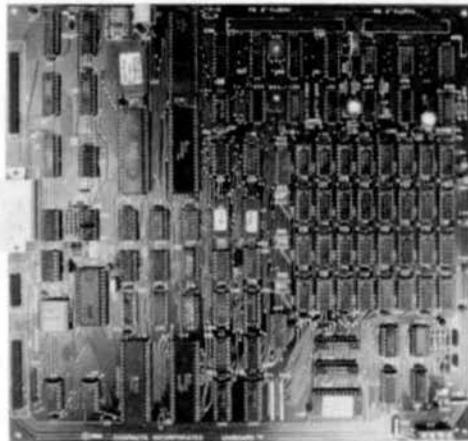
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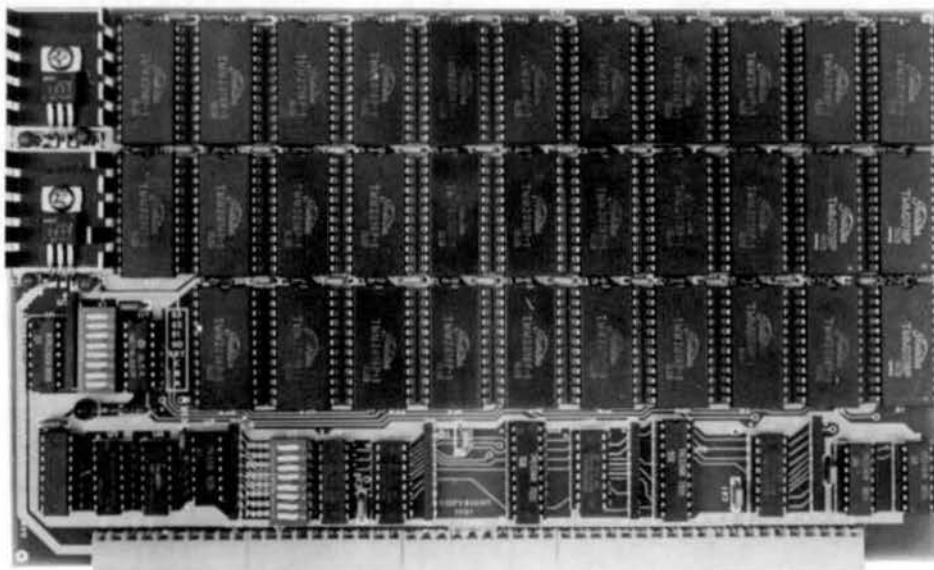
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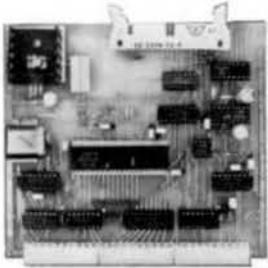
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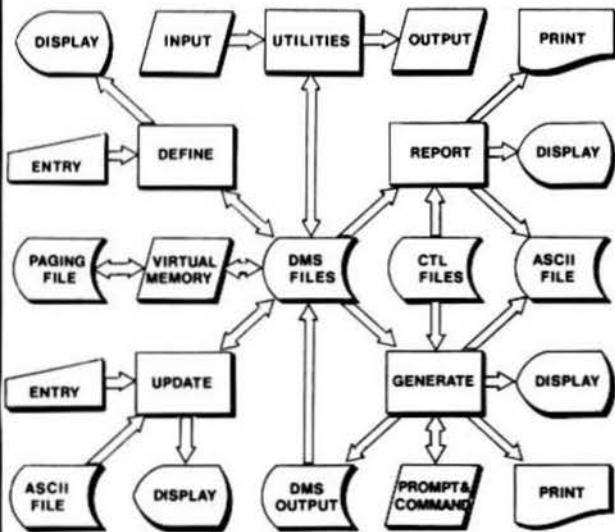
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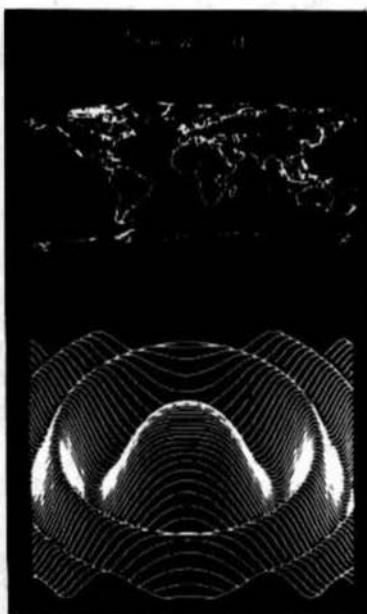
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S-R/R w/o memory chips  
S-R/R with 48K  
SP-1  
6802 SUPER CPU  
VIDEO RAM  
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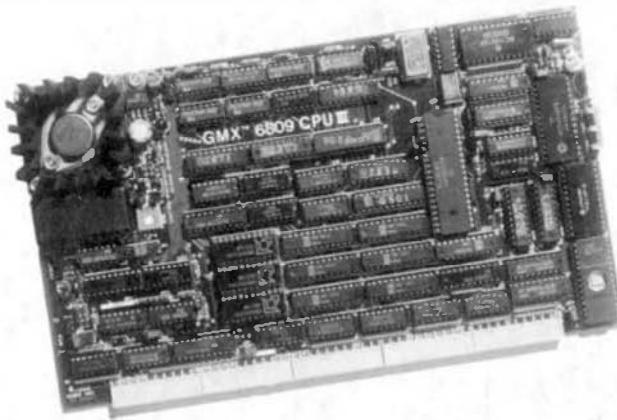
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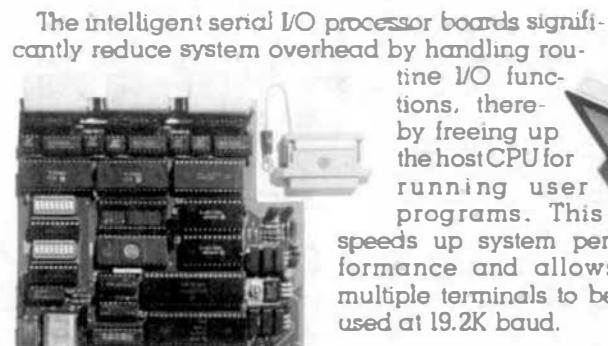
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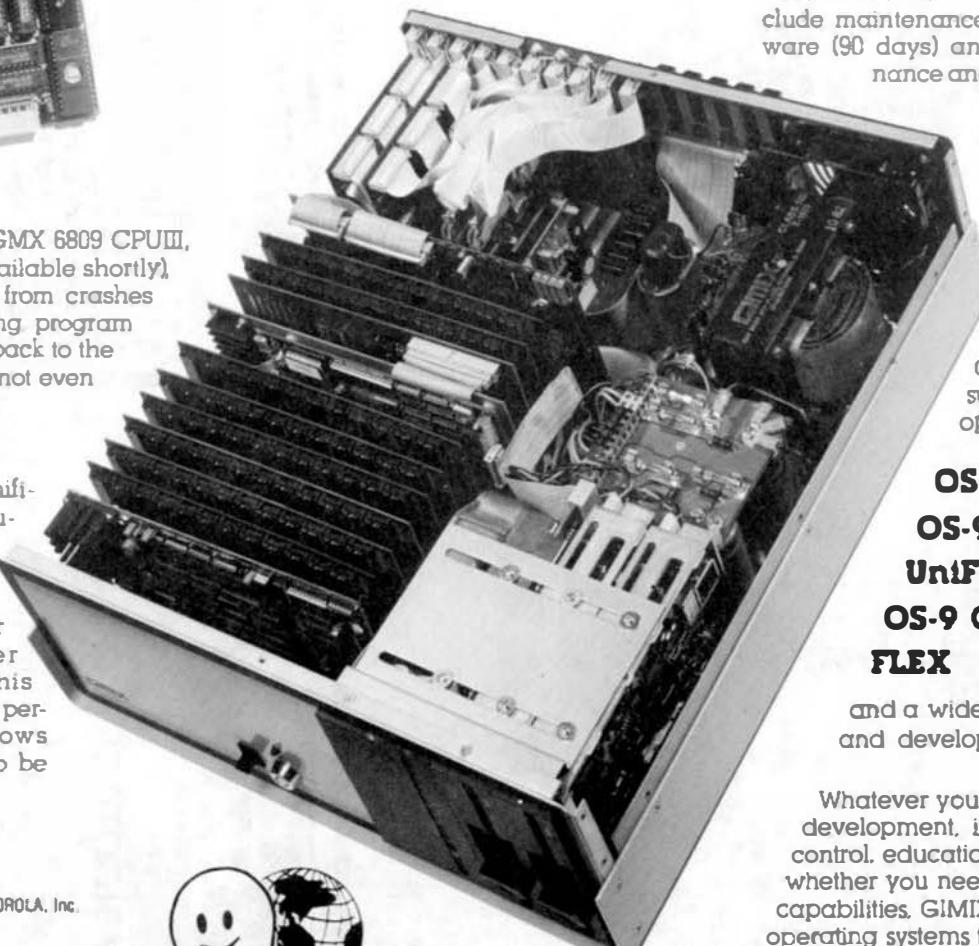
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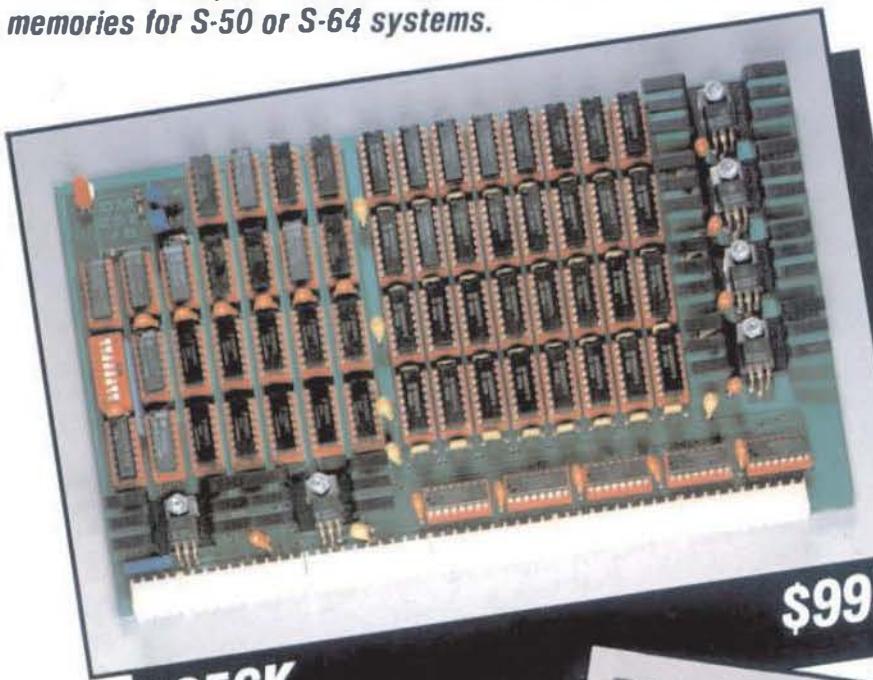
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